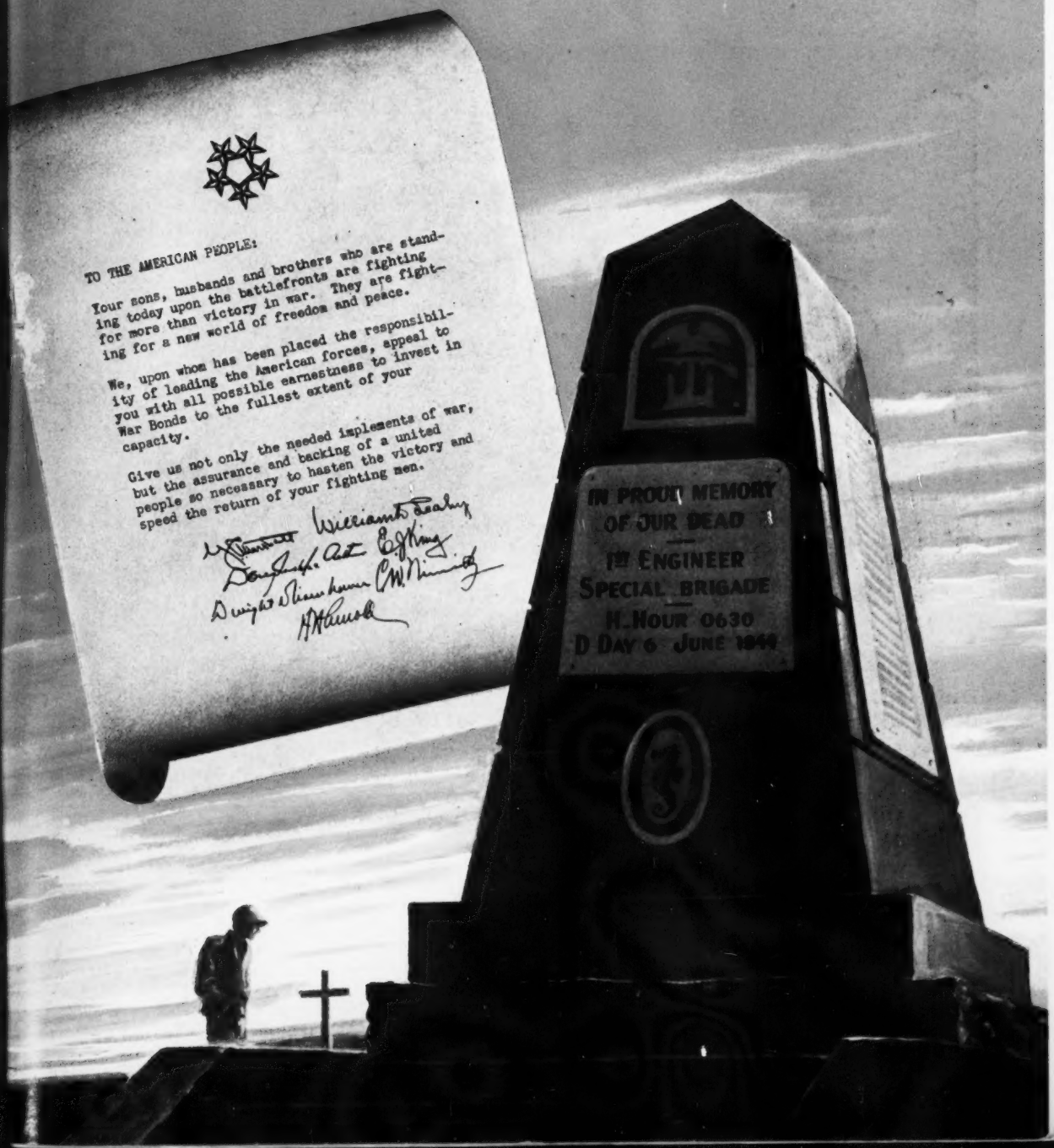
JUN 5 1945

ENGINEERING NEWS-RECORD

MAY 31, 1945


TO THE AMERICAN PEOPLE:
Your sons, husbands and brothers who are standing today upon the battlefronts are fighting for more than victory in war. They are fighting for a new world of freedom and peace.
We, upon whom has been placed the responsibility of leading the American forces, appeal to you with all possible earnestness to invest in War Bonds to the fullest extent of your capacity.
Give us not only the needed implements of war, but the assurance and backing of a united people so necessary to hasten the victory and speed the return of your fighting men.
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How to Build Big Sewers QUICKLY

This storm sewer job along the East coast really "marched" because the engineers used rugged ARMCO MULTI PLATE *Arches with their quick assembly and backfilling features. No delay, no form-work, no curing. The installation has a 20-ft. span, 10-ft. rise, and is 1800-ft. long.*

Design and construction of large storm or intercepting sewers can be simple and quick.

For spans ranging from 10 to 28 feet, ARMCO MULTI PLATE Arches provide a logical form of construction. First is the reinforced concrete base with low, grooved "abutments" at either side to support the arch plates above the flow line. Next is quick assembling and bolting of the MULTI PLATE arch, followed immediately by backfilling *directly against the metal.*

No delay, no complicated form-work, no waiting for the arch to cure. Curved alignment, connections and manholes are no problem.

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ENGINEERING NEWS-RECORD

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McGRAW-HILL PUBLISHING COMPANY, INC.

Publication Office: 99-129 North Broadway, Albany 1, N. Y. • Editorial and Executive Offices: 330 West 42nd Street, New York 18

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Publisher*

Vol. 134 MAY 31, 1945 No. 22

COMING NEXT

Reconstruction of destroyed European harbors has called for the exercise of considerable ingenuity, and represents one of the most important Army Engineer jobs of the war. Because the tides in these ports are vastly greater than any experienced in our own ports, movement of ships requires locked basins. These in turn necessitate many bridges to expedite road and rail traffic to and from the docks. In the June 14 issue Waldo Bowman will describe the work in restoring these ports.

High velocity and the tremendous energy developed by 200,000 sec. ft. of water falling 487 ft. over the spillway of Shasta Dam required that excess water and entrapped air be removed from the concrete to increase its hardness and resistance to wear. About 0.85 lb. of water per sq.ft. of surface was removed by vacuum process at a cost of 20 cents. How this operation was carried out will be discussed in the June 14 issue.

A four-lane retractable concrete pontoon bridge with 170-ft. clear span, in open position, has been completed in the Los Angeles Harbor. Special interest is attached to original ideas in the use of shear lugs, guide yokes and ramp knuckles. The design and construction features will be described in June 14 issue.

LOOKING AHEAD

The Captain Cook Graving Dock, 1,177 ft. long, now in service at Sydney, Australia, is reported to be that country's greatest engineering achievement. An unusual feature is the provision for dividing the dock into two separate units by use of an auxiliary caisson that can be installed at an interior point. The dock and appurtenant works were built in the dry inside a 33-acre cofferdam. Caisson gates were built inside the cofferdam and floated to position after the cofferdam was flooded. Design and construction will be described in an early issue.

Probably no other function of municipal activity shows greater variety in method than that of refuse collection and disposal. The methods being used in six major cities in widely separated sections of the country will be presented in a forthcoming issue.

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Number of copies of this issue printed: 36,158

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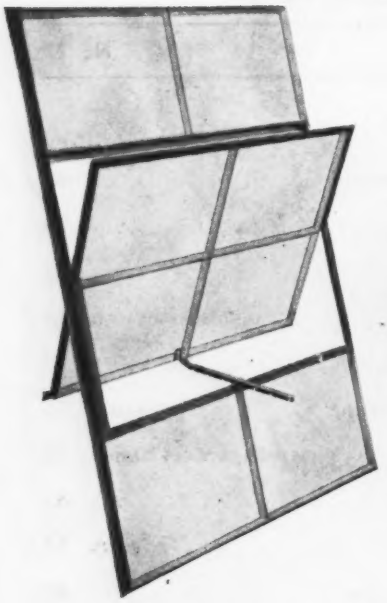
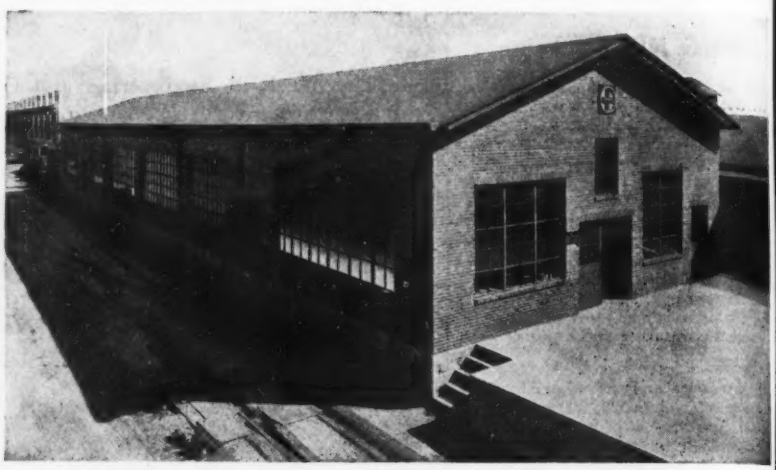


For railway industrial buildings of all types, Truscon Pivoted Steel Windows offer the maximum in sturdiness, long life, weathertightness and ease of operation. Below is a typical illustration showing results that can be achieved with these windows.



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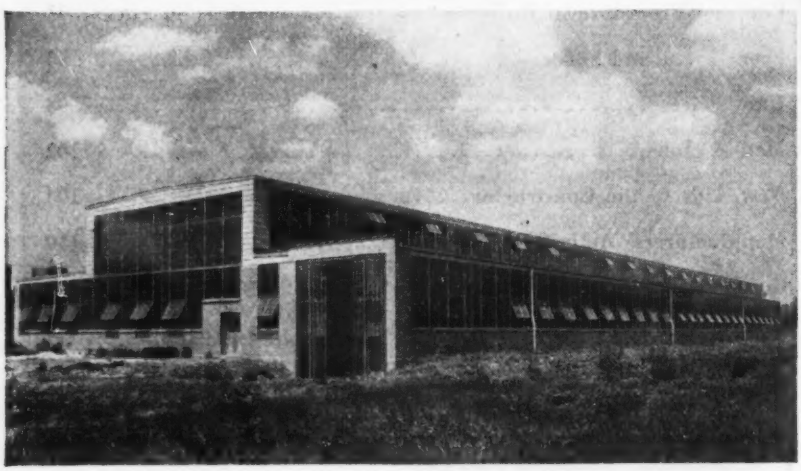

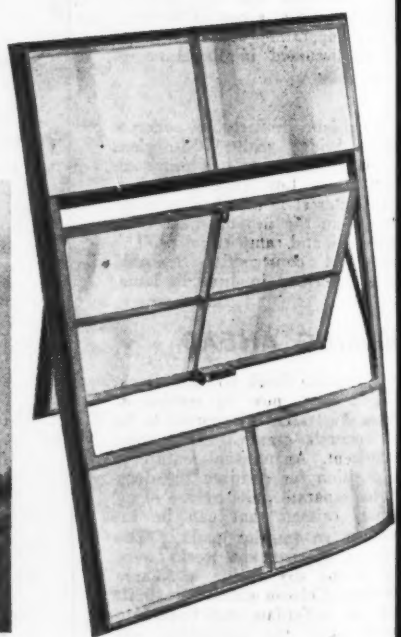

Ask our experienced engineers to help plan your use of windows to obtain maximum daylight and ventilation at a minimum cost.

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LIGHT AND AIR ARE FREE • USE THEM!

ARMY E NAVY

Postwar Construction Ready for Bids

POSTWAR CONSTRUCTION ready for bids with plans completed and with all legal, land and financing obstacles overcome, totals $675,964,000 for the 28 months from January 1943 through April 1945. Distribution of this volume, however, is poor, both regionally and by type of work.

Geographically, 60.3 percent of the ready-for-bids volume is concentrated in the Middle Atlantic states. Middle West accounts for 11.9 percent; South, 11.7 percent; West of Mississippi, 9.8 percent; Far West, 4.5 percent; and New England, 1.8 percent. The large share for Middle Atlantic is attributable to the volume of projects ready for bids in New York State, aided by the rush to file building plans in New York City before the new building code went into effect.

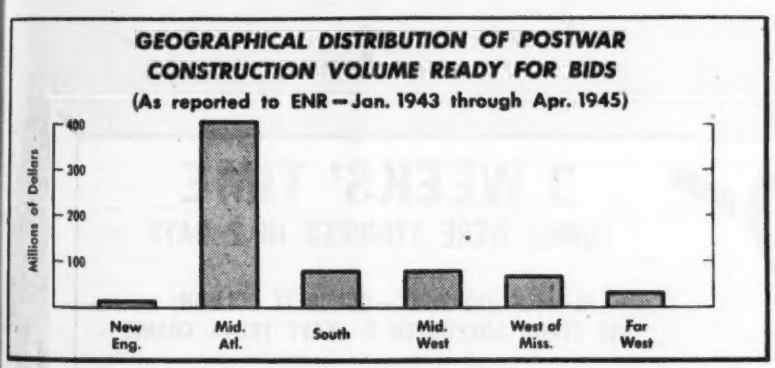
This latter factor was responsible for most of the $230,895,000 reported in New York State for commercial building projects, a volume 90 percent of the $256,591,000 total for commercial buildings ready for bids in the entire country.

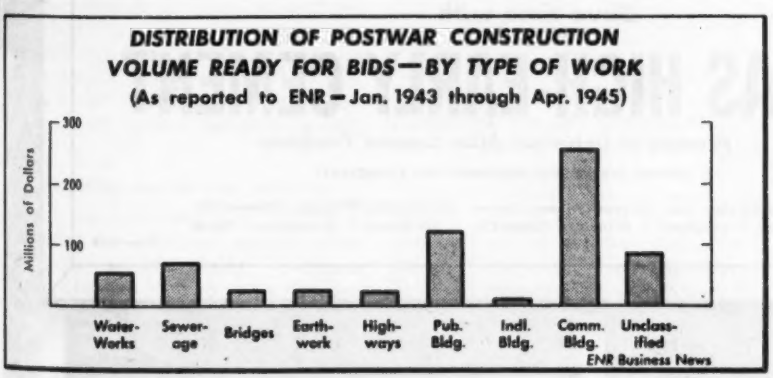
Commercial buildings make up 37.9 percent of the U.S. total ready for bids; public buildings, 18.3 percent; unclassified construction, 12.5 percent; sewerage, 10.3 percent; waterworks, 7.8 percent; earthwork and drainage, 4.0 percent; bridges, 3.9 percent; highways, 3.7 percent; and industrial buildings, 1.6 percent.

POSTWAR ENGINEERING CONSTRUCTION VOLUME READY FOR BIDS

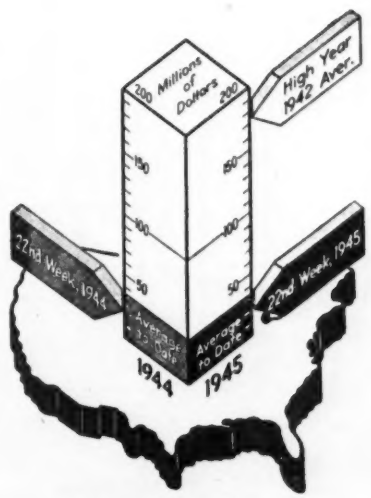
(As Reported to Engineering News-Record — January 1943 through April 1945)
Thousands of Dollars

Class of Work	New England	Middle Atlantic	South	Middle West	West of Miss.	Far West	U. S. Total
Waterworks	178	37,326	9,309	1,519	3,303	867	52,502
Sewerage	418	7,307	23,546	34,671	2,343	1,517	69,802
Bridges	470	19,120	1,632	2,271	161	2,655	26,309
Earthwork	15	1,821	....	371	12,320	12,301	26,828
Highways	786	6,355	5,295	5,187	4,127	3,348	25,098
Public Bldg.	3,784	85,073	7,906	17,462	7,235	1,920	123,380
Ind'l Bldg.	375	5,985	3,270	455	735	....	10,820
Comm. Bldg.	2,450	232,906	2,648	9,575	6,335	2,675	256,591
Unclassified	3,392	11,697	25,803	8,910	29,502	5,330	84,634
Total	**$11,868**	**$407,592**	**$79,409**	**$80,421**	**$66,061**	**$30,613**	**$675,964**





CONSTRUCTION ACTIVITY



As Reported This Week to...
Engineering News-Record

CONTRACT VOLUME

Continental U. S. Only
(Thousands of Dollars)

	Week of May 31 1945	Cumulative 1945 (22 wk.)	Cumulative 1944 (22 wk.)
Federal	$11,844	$398,989	$504,317
State & Municipal	4,300	95,411	81,093
Total Public	$16,144	$494,400	$585,410
Total Private	5,260	191,141	171,823
U. S. Total	**$21,404**	**$685,541**	**$757,233**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Type of Work	Dollar Volume (Thousands) This Week	Cumulative 1945 (22 wk.)	Cumulative 1944 (22 wk.)
Waterworks	$116	$17,001	$9,805
Sewerage	84	11,985	10,141
Bridges	603	11,097	4,993
Highways	3,579	67,251	71,431
Earthwork, Waterways	173	14,427	28,492
Buildings, Public	4,933	276,657	294,658
Industrial	4,764	132,325	71,954
Commercial	300	34,922	79,036
Unclassified	6,852	119,876	186,723

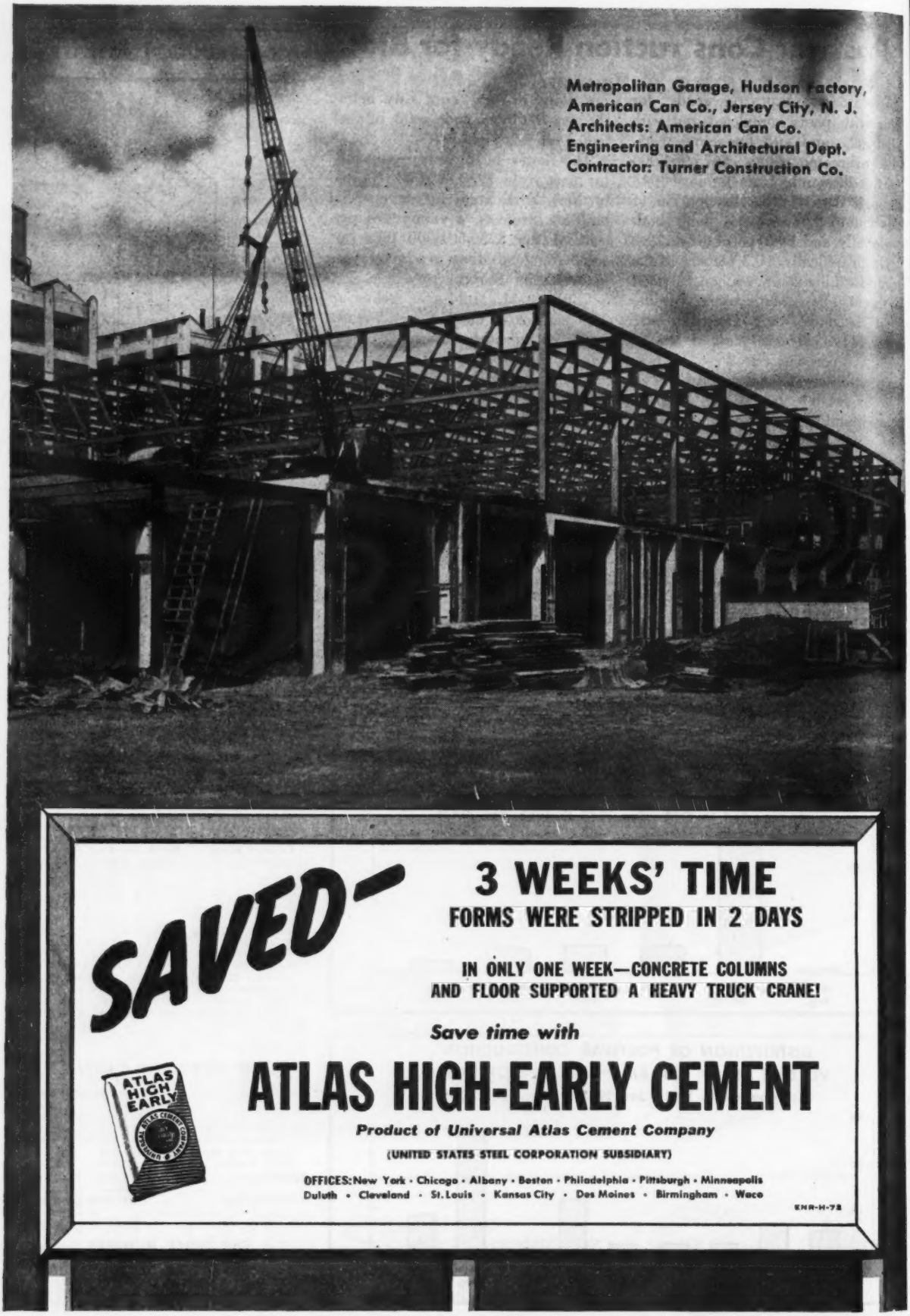
NOTE: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1945 (22 wk.)	Cumulative 1944 (22 wk.)
NON-FEDERAL	$260,700	$182,231
Corporate Securities	74,812	82,599
State and Municipal	164,988	45,852
RFC Loans	20,900	53,780
FEDERAL	$251,010	$245,266
Total Capital	**$511,710**	**$427,497**

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	May '45	307.43	147.78
Building Cost	May '45	238.46	128.90
Volume	Apr. '45	99	43


Metropolitan Garage, Hudson Factory,
American Can Co., Jersey City, N. J.
Architects: American Can Co.
Engineering and Architectural Dept.
Contractor: Turner Construction Co.
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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • MAY 31, 1945 • VOLUME 134 • NUMBER 22

Much civilian construction now permitted by WPB

Most price ceilings of control Order L-41 increased five-fold and numerous classes of work allowed to go ahead regardless of cost

Amendments to Order L-41 made by the War Production Board on May 29 are the first major steps in the relaxation of government controls over construction. As a result a large volume of civilian construction can now go ahead. In last week's issue brief mention was made of the plan to relax Order L-41. These relaxations can now be described in detail.

Higher cost ceilings

One major change in the order is a 5-fold increase of the annual dollar value limits on numerous types of construction that may be undertaken without WPB authorization. The new cost ceilings on housing are: One-family house, including a farm home, $1,000; two-family dwelling, $2,000; three-family house, $3,000; four-family structure, $4,000; and a 5-family residential building, $5,000. These limits apply to repair and maintenance work, as well as to alterations and new construction. The former cost limit for a house, up to and including a 5-family dwelling, was $200.

Other new annual cost ceilings include: $5,000 for a hotel, apartment building or other residence for six or more families; $5,000 for an office, bank, store, laundry, garage, restaurant, theater, warehouse or other retail or wholesale service establishment; $10,000 for church, hospital, school, college building, USO club, playground for children, public building, post exchanges on military reservations, canal, storm sewer, dam, levee, or jetty or retaining wall needed for shore protection.

Factories and bridge projects

Also, an expenditure of $25,000 is permitted for a factory, plant or other industrial project, bridge, overpass, underpass, tunnel, dock, pier, commercial airport, bus terminal, truck terminal, railroad or street railway building, research laboratory or pilot plant. Formerly, the cost limit for a bridge, tunnel, dock, pier, airport, and railroad and street railway building was $1,000, while the limit for some types of factories or plants was $5,000 and for other types $200.

The amendment also permits $1,000 for an irrigation or drainage system serving more than one farm; $1,000 for farm construction, exclusive of the farmhouse; and $1,000 for any other kind of a "unit".

The amended order defines "unit" as a single independently operated structure or building or a group of structures serving the same general purpose. However, it also can mean pipelines and road projects.

No ceilings for some work

The second major change in Order L-41 was an increase in the types of work that may be undertaken without WPB permission regardless of the cost in any one year. In all, 21 special kinds of construction are included. These are:

1. Drilling and casing water wells, not including any use of pipe to conduct water on the surface.
2. Grading, ditch-digging or similar earth-moving operations if no lumber or other building materials are permanently installed, except drainage pipe.
3. The use by any logger or lumber manufacturer of lumber, nails, gravel or clay products in construction needed to change the site of logging or lumbering operations.
4. Construction of public highways and public streets owned by a government agency. (This construction is controlled by Order L-41-e).
5. Construction of structures to be used directly in the development of mineral deposits.
6. Construction which is regulated by any order issued or administered by the Petroleum Administration for War.
7. Construction of facilities to be used directly in furnishing wire communication services and to be owned by an operator as defined in WPB orders U-3 and U-4, which pertain to the procedure to be followed to acquire materials for wire communication facilities.
8. Construction of facilities to be used directly in furnishing electric, gas, water or central steam-heating services and which will be owned by a utility producer as defined in WPB Order U-1.

(Continued on next Page)

Courts may choose highway engineer

Prospects that the courts may be called upon to decide which of two candidates is entitled to the $7,500-a-year-job of Colorado state highway engineer arose recently as a prolonged controversy involving the State Civil Service Commission, the State Highway Department and Governor Vivian approached a climax.

The dispute arose over the selection of a successor to Charles D. Vail, whose death in January left the state post vacant. Governor Vivian's choice for the position was Arthur F. Hewitt, who has been acting highway engineer under a temporary appointment issued Jan. 16.

Under Colorado's laws, however, the position must be filled by the candidate placing first in an examination conducted by the Civil Service Commission. In the examination which followed Mr. Vail's death, Mark U. Watrous, a Pueblo construction man, placed first with Mr. Hewitt reportedly taking third place.

The Colorado law also requires that a candidate for the post of State Highway Engineer must pass a physical examination before he can qualify for the appointment. Mr. Watrous hurdled this final barrier and the Civil Service Commission indicated its intentions of certifying him for the position.

Mr. Hewitt immediately filed a strong protest with the commission and announced his intention of taking his case before the courts if his protest is not successful.

9. Construction of facilities which will be used directly for a sewerage system and which will be owned by a sewerage-system operator as defined in WPB Order P-141.

10. Laying of railroad tracks and the construction of other necessary railroad-operating facilities.

11. Construction jobs classed as minor capital additions under Controlled Materials Plan Regulation 5, when done in industrial plants or under CMP Regulation 5A.

12. Construction given priorities assistance under Paragraph e-2 of WPB Order P-43 relating to laboratories; Order P-47 relating to civilian aircraft facilities; Order P-68 pertaining to facilities for the manufacture of steel; Order P-89 relating to facilities for the manufacture of chemicals and Directive 23 to CMP Regulation 5, or that relating to facilities for international point-to-point radio communication carriers.

13. Installation in an existing building or the erection outside of a building of machinery or equipment used for the manufacture, processing or assembling of goods or materials, but not including new buildings or additions to existing ones.

14. Construction of buildings or structures owned by the U. S. Navy, Army, Maritime Commission, War Shipping Administration, Coast Guard, Marine Corps, Veterans Administration, Civil Aeronautics Administration, Coast and Geodetic Survey or Panama Canal.

15. Facilities to house prisoners of war assigned by the Army to the builder when priority assistance for the construction has been granted on Form CMPL-593.

16. Construction jobs begun before Order L-41 became effective, which was April 9, 1942, or when the project was not limited by the order and which has gone on without interruption.

17. Maintenance and repair on units other than houses or residential property—provided the amount spent for a building in any calendar year does not exceed 20c per sq.ft. of the gross floor area.

18. Minimum work necessary to prevent more damage to a building or structure (or its contents) damaged by fire, flood or like causes.

19. Rebuilding or restoring a structure damaged or destroyed by disaster where the Red Cross has been given priority assistance to restore the disaster area, and where the structure has been determined by the Red Cross to be essential.

20. Construction necessary to prevent threatened loss of farm products, where immediate construction is determined by the War Food Administration to be essential.

21. Wire fencing on farms and the erection of farm silos manufactured by a producer as defined in Order L-257.

Repair of structures

In addition, amended Order L-41 permits the rebuilding or restoration of a residential structure damaged or destroyed after July 1, 1943, by fire or the like if the cost is less than $5,000. It also permits reconstruction of farm structures if the work costs less than $5,000 and if immediate construction is considered essential to the agriculture program by the War Food Administration.

Highway work speeded

The most important liberalization regarding the classes of work just mentioned relates to earth-moving operations where no lumber or other extremely critical material is involved. This exemption will permit initiation of work on highways, airports, and several other types of constructon, WPB officials point out. They emphasize, however, that the new exemption does not mean that the WPB will necessarily approve construction in the future or grant priority assistance, even if the applicant has done a large amount of preliminary work under the exemption.

The WPB also stresses that Directive 5 to Order L-14, which permits extensive construction work necessary for industrial reconversion, is still in effect. Operations permissible under this directive were explained in *Engineering News-Record* May 3, 1945, vol. p. 607.

In explaining why the construction controls could not be lifted completely, John L. Haynes, director of WPB's Construction Bureau said, "The construction industry is one of the largest potential users of resources and one of the largest potential employers of manpower. It is therefore a key industry in the partial reconversion made possible by V-E Day, and as such it should operate under as much freedom as possible.

"Unfortunately, lumber and many other construction materials are expected to remain in short supply for some time and manpower is not yet available in many areas. These factors and the necessity of maintaining war production, make it impossible to remove all construction controls now. The amended order provides for the resumption of the safest maximum volume of construction consistent with the availability of materials."

War bond cover inspired by Engineer memorial

"Invest in war bonds to the fullest extent of your capacity" is the appeal of our top military leaders, which Engineering News-Record on this week's front cover couples with a reminder that there have been those who died in the same cause for which we are asked only to loan our money.

The cover drawing, made by McGraw-Hill artist Theodore Van Gorp, depicts the memorial shaft erected on Utah Beach in Normandy in memory of the members of the 1st Engineer Special Brigade who lost their lives in the invasion. Mr. Van Gorp used the above picture of the memorial as the inspiration for his drawing. The picture was taken by Brig. Gen. L. D. Worsham, Assistant Chief of Engineers, on a recent visit to this engineering shrine, and shows the memorial in its position atop a German pillbox on the beach where it was erected by the men who survived the attack. The insignia on the monument refer to the Army and Navy components of the Engineer Special Brigades.

Most building materials are scarce and supply is getting tighter

Less available now than at any time since 1941—Lumber and steel especially hard to get

Most building supplies are shorter in supply than at any time since the war started, the War Production Board says. Lumber is extremely critical and is expected to continue so for some time. Steel is now difficult to obtain, and numerous other supplies may be hard to get in the near future.

Regardless of this fact, the WPB has relaxed considerably the general control on construction order L-41, and some types of work will be permitted to proceed regardless of the cost, as was reported in last week's issue and outlined in more detail in this issue. This seeming inconsistency is explained by the desire of the federal agencies to avoid extensive unemployment and to permit construction to get the necessary start to take its proper place in the post-war picture. It is believed that the building supplies situation will improve appreciably in the next few months, because of discharged veterans aiding the manpower problem and military cutbacks making larger quantities of materials available for civilian work. However, lumber is expected to prove the exception and is seen as being short in supply for many months.

A recent nation-wide survey by the WPB shows the conditions as to the basic building materials to be as follows:

Steel (General)—Production schedules tighter than at any time during the last two years.

Structural Steel—Rolling mills generally booked through July, except on the Pacific Coast where some space may be available in July. Wide flange sections are booked into August.

Plates—Somewhat easier, space still open for second quarter in eastern mills.

Sheet and Strip—Sheet deliveries for practically all mills filled through third quarter, and galvanized deliveries not obtainable until the fourth quarter. Some mills are booked into 1946.

Reinforcing Bars—While obtainable, in tighter supply than two or three months ago.

Reinforcing Mesh—13-gage and finer in tight supply, and heavier gages more readily obtainable.

Bar Joists—About 60 days required for delivery, designers being cautioned to avoid their use if immediate delivery required.

Steel Pipe—Seamless pipe booked up, in manufacture, until August or September and lapwelded pipe possibly until July.

Metal Building Materials—Metal lath, gutters, downspouts, fittings and sheet metal products will continue in short supply through second quarter of 1945.

Lumber—Supply of 1-in. and 2-in. material extremely tight, 3-in. material not so tight, and thicknesses over 3 in. relatively easy to obtain. However, western pine and better grades of hardwood generally prohibited for construction.

Hardwood Flooring—No stocks available and production through 1945 will be absorbed by projects already authorized.

Wood Shingles—Supply situation tight with no prospect of improvement as long as labor is engaged in manufacture of lumber required for war work.

Plywood—Softwood plywood under limitation control, and little available for construction. Hardwood plywood not under limitation control, purchases being subject only to limitations of priority ratings, but deliveries require 60 to 90 days and supply getting tighter.

Portland Cement—Supply exceeds demand and since production is only about 30 percent of 1942 peak, no shortage seen.

Cast Iron Pressure Pipe—Mills operating below capacity, current backlog of orders represent 3½-month production and no stocks of consequence exist. Thus delivery might be delayed.

Brass and Copper Pipe—No relaxation of restrictions covering these materials seen possible for next few weeeks.

Clay Sewer Pipe—In good availability with adequate dealer stocks.

Concrete Pipe—Both plain and reinforced drain pipe readily available.

Asbestos Cement Pipe—Easy to obtain.

Asbestos Roofing and Siding Shingles—Deliveries are running about three to four months after receipt of orders.

Cement Asbestos Corrugated Sheets—Essential civilian orders can be delivered in 60 to 90 days, although most manufacturers are booked up throughout third quarter of year and, in most instances, in fourth, too.

Asbestos Flat Sheets—Can be obtained on high-rated orders in 60 to 90 days, but manufacturers are booked up well into third quarter.

Asphalt—In good supply and may be used for paving and road work generally.

Asphalt Roofing—Manufacturers' or dealers' stocks negligible and there is a 60-day backlog of unfilled orders.

Common and Face Brick—While shortage exists in certain areas, brick generally available.

Vitrified Paving Brick—Readily available.

Structural Insulation Board—While subject to delay in delivery, in fair condition.

Clay Products—Suppliers unable to provide immediate delivery in some sections of country, but overall picture is good.

Structural Clay Tile—Stock reserves low in Alabama, Georgia and North Carolina, but elsewhere fairly good.

Laminated Fibre Board—Production capacity not fully utilized and no severe shortages anticipated.

Hardboard—Most of production absorbed by armed services and other claimant agencies for approved construction and essential industrial uses.

Floor and Wall Tile—Production not meeting demands and stocks low, orders being subject to 6 to 8 months delay in delivery; manpower shortages limiting factor.

Glazed Brick—Supply not too plentiful.

Glazed Hollow Facing Tile—Large backlog of unfilled orders.

Unglazed Hollow Facing Tile—Large list of unfilled orders.

Cast Iron Boilers—Fair supply, except in small sizes, obtainable, but six weeks delay in delivery probably.

Steel Boilers (Steam and High Pressure)—Orders booked solid for six months.

Steel Boilers (Low Pressure)—Larger sizes obtainable on approved orders, although delivery is uncertain.

Steam and Hot Water Controls and Accessories—Manufacturers unable to fill orders with low WPB priority ratings.

Unit Heaters—Supply short.

Warm Air Distribution Equipment—In tight supply.

Bathtubs—Limited quantity of cast iron tubs available without priorities, manufacture of steel tubs prohibited, and earthenware units are subject to 3-months delay in delivery.

Fixture Fittings, Trim, and Accessories—Available supply low with production of some types prohibited.

Cast Iron Soil Pipe—Critically short.

Lead Traps and Bends—Little available.

Electric Motors—Situation critical and to continue so for some time, due to current military demands.

Sprinklers and Fire Equipment—Fire protection equipment supply as a whole is sufficient to meet demands of armed forces and essential civilian requirements, with certain exceptions.

Hardware—General hardware supply sufficient for present demands.

Sheet and Copper Flashings—Use still restricted; practically no supplies available.

Wrought Iron Supplies—Pipe available, wrought and malleable iron for railings, grilles, and ornamental iron prohibited.

Electric Wire—No. 10 and smaller wire and armored conductors, though in tight supply, are not in critical position. Delivery subject to some delay.

Commercial and Industrial Stokers—In good supply; priory rating required.

Domestic Stokers—Limited supply or insufficient to meet demand.

Domestic Floor and Wall Furnaces—Stocks negligible and demand exceeds supply.

Oil Burners—Industrial types in limited stock, and only limited quantity of domestic types.

Loans and grants for construction of health facilities proposed

Amendments to Social Security Law would provide $950,000,000 for building hospitals, etc., in a 10-year period

Included in the proposed amendments to the Social Security law as prepared by Senator Wagner and announced May 24 is a section on grants and loans for construction of health facilities. The projected amendments provide for a 10-year program of federal grants and loans for the construction and expansion of hospitals, health centers and related facilities to be financed out of general revenues.

$5,000,000 for surveys

A total of $5,000,000 is authorized to be appropriated, to provide grants to the states to assist them (with their own funds) to make the surveys. The Surgeon General of the Public Health Service is authorized to make such surveys in the event a state does not do so.

A total of $950,000,000 is authorized to be appropriated over a ten-year period for construction grants and loans, of which $50,000,000 is for the fiscal year 1946, and $100,000,000 for each of the nine succeeding years. The program is to be administered by the Surgeon General of the Public Health Service, with the assistance of the Federal Works Agency, on construction matters.

Grants, or grants and loans, may be made to states, their political subdivisions and to non-profit organizations for hospitals and health centers. All amounts appropriated are to be available until spent, except that balances at the end of the tenth year, and loans as they are repaid, revert to the Treasury.

Loans are to be repaid within twenty years and are limited to hospitals which receive grants. The grants shall be for not less than 25 percent nor more than 50 percent of the cost of the project, exclusive of the cost of the site. Loans may not exceed 25 percent of the cost of the project.

Vancouver plans to use war housing property

Fearing that real estate speculation and uncontrolled building might depress property values if all federal lands in that vicinity were dumped indiscriminately on the market after the war, local agencies and civic organizations in Vancouver, Wash., have drawn up a program of federal-local cooperation for disposing of war housing and land.

The program includes specific proposals for the use of particular lands and structures. The Vancouver housing authority, for example, has already applied for permission to acquire the three federally-owned, permanent, war housing developments in the area, proposing to use them for postwar low-rental housing. The developments contain 1,000 units, which the authority believes will be sufficient to house the city's low income families.

Vancouver's population increased from 18,000 to 83,000 in 1943 alone. Since at least 50 percent of the city's in-migrant workers plan to remain in the area after the war, the school district proposes to build a junior college, senior and junior high schools, several elementary schools, and an experimental farm for an agricultural program. The health department hopes to build a tuberculosis sanatorium on the site of a temporary war housing development. Parks, a golf course, a riding academy, and a cemetery are planned for other surplus lands.

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Money is made available for Michigan highways

Financial assistance to Michigan cities, counties and townships for postwar construction has been provided in two tax measures passed by the Legislature and signed by Governor Kelley.

One of the acts is expected to produce $7,500,000 to $8,500,000 from an additional 10 percent tax on liquor. The money is to be returned to cities and to county road commissions on a population basis. The municipal portion may be used for capital improvements, public works and street construction, and the county portion is to be used for the construction and improvement of former township roads now under the jurisdiction of the county road commissions. After the split on the population basis, the county portion will be allocated to the individual counties on a road mileage basis. About 75 percent of the fund probably will go to the municipalities.

The other act revises the state's intangible tax law and is expected to produce about $6,000,000. Split between the cities and townships on a strictly population percentage, the money may be used for postwar construction.

Other acts of the legislature authorize county road commissions to engage consultant and professional services; provide for acquisition of overhead and underground rights by public corporations; and set up an assessment plan for the construction of sidewalks and roads in built-up areas adjacent to municipalities.

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Chief Engineer Dixon of C. N. R. retires

H. A. Dixon, for the last five years chief engineer of Canadian National Railways, has retired after 42 years of continuous railroad service. A graduate in engineering of the University of Toronto, Mr. Dixon joined the staff of the Canadian Northern Railway in 1903 at Winnipeg. He was engaged on the construction of many new lines in the west of Canada, and was appointed chief engineer of the western region when Canadian National Railways was formed in 1919.

Barton W. Wheelwright succeeds Mr. Dixon. He has been chief engineer of the central region at Toronto since 1939. A native of Minneapolis and a graduate in civil engineering from Harvard University and M.I.T., Mr. Wheelwright joined the Grand Trunk Railway at Toronto in 1911. In 1936, he was appointed engineer of maintenance of way for the C.N.R. central region at Toronto. Ernest Roy Logie succeeds Mr. Wheelwright, advancing from engineer of maintenance of way in the central region of the C.N.R. Mr. Logie is a graduate of the University of New Brunswick. He joined the staff of the Grand Trunk Railway in 1907 and has served with the C.N.R. at Winnipeg and at Edmonton.

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Correction: Detroit building trade wages

Detroit building trade wage rates published in the table on page 130 of the April 5 issue of *ENR* were incorrectly reported for masons' helpers as $1.15, whereas the correct rate is $1.00 per hour. The rate for roofers, $1.95, applies only to slate roofers; composition roofers' rate is $1.55. Hoisting engineers' rate, recorded as $1.83, applies only to hoisting structural steel. For tractor operators and power shovel operators the hourly rate should have been $1.675 instead of $1.83.

George T. Seabury dies: A.S.C.E. secretary

George T. Seabury, secretary of the American Society of Civil Engineers, died May 25 following a coronary thrombosis on May 23. He was to have turned over the secretaryship of the society to Col. Wm. N. Carey on June 1, following Colonel Carey's release from the Army (*ENR* May 24, vol. p. 733).

Mr. Seabury was born in Providence, R. I., Apr. 12, 1880, and was graduated from Massachusetts Institute of Technology in 1902. He was elected secretary of the A.S.C.E. late in 1924, taking office on Jan. 1, 1925. On completion of 20 years in that position he asked the Board of Direction at its January meeting this year to permit him to retire when a successor could be found.

In recognition of this 20 years of service to the civil engineering profession, *Engineering News-Record* had prepared an account of his career for publication in the issue of June 7, giving special attention to his contribution to the work of the American Society of Civil Engineers. With minor modifications called for by Mr. Seabury's death, that account of his life will be published in next week's issue.

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New York City plans ten housing projects

A $95 million program for ten new low-rent housing projects in blighted areas of New York City was announced by Mayor Fiorello H. La Guardia after he had reached a final agreement with the New York City Housing Authority and the City Planning Commission.

Of this amount, $35 million is expected to be supplied by the state and $60 million by the federal government. The state funds will be raised by a bond issue and will be supplemented by subsidies, as needed, to keep rent levels down.

Upon their completion, the ten new projects will raise to about $304 million the total cost of public low-rent housing built under the La Guardia administration and will provide for about 50,000 families.

The exact sites of the projects have been selected, agreement has been reached on approximate costs and tentative dates have been set, but these details have not yet been revealed. All sites on the program will be acquired by condemnation. They are located in undesirable areas where there is not the slightest chance of rehabilitation through private enterprise.

Flood damage is high in south central states

Recent flood damage to highways and bridges in Oklahoma, Missouri, Arkansas, Tennessee, Mississippi and Louisiana is expected to exceed that of several years past.

The damage in eastern Oklahoma is estimated at $2,500,000, principally to the highways near the Arkansas and North Canadian rivers and the Barron Fork of the Illinois River, according to Ben T. Childers, chairman, Oklahoma State Highway Commission.

"We lost five major bridges and more than 100 miles of pavement and an untold number of smaller structures," said Mr. Childers, and he added that every effort is being made to repair the damage as quickly as possible.

Arkansas damage is expected to amount to approximately $804,000, according to figures compiled by N. B. Garver, chief engineer, and released recently by Neill Bohlinger, secretary of the Arkansas State Highway Department.

Infringement case won by Caterpillar

Fourteen years of litigation involving infringement of patents on track laying tractors was terminated in San Francisco, May 2, when International Harvester Co. agreed to pay Caterpillar Tractor Co. $6,000,000 as a compromise settlement of the case.

The suit originated in 1931 when Caterpillar sued Reinhardt's, Inc., of Nevada as International distributors of track laying tractors, claiming infringement on 23 patents. When the case was called for trial, however, only six counts were pressed. Most important of the patents involved was the Turbull, issued in 1919, applying to rigid frame tractors.

A Federal Court decision that five of the patents had been infringed was handed down in Carson City in March, 1934. The case was appealed to the third U. S. Circuit Court in Philadelphia and subsequently was returned to the District Court in Carson City where the issue stood when compromised.

JOBS OF THE WEEK

AIRFIELD, Maxwell Field, Ala.

U. S. Engineers, Mobile, awarded a contract for additional reinforcement and reconstruction of runways and taxiways at Maxwell Field Air Base to Wright Contracting Co., Columbus Ga., at $1,350,000; improving apron pavement to Bloomer & Benness Co., Milwaukee, Wis., at $925,199.

ROADS, Bridges, etc., Juarez, Mexico

City of Juarez, Arturo Chavez, Juarez, will construct roads, highways, bridges water and sewerage improvements by its own forces. The estimated cost is $800,000.

HOSPITAL, Sioux Falls, S. D.

Veterans Administration, Washington, D. C., awarded a contract for the construction of Main Building 5, at U. S. Veterans Hospital to McGough Brothers, St. Paul, Minn., at $1,260,000.

PIER EXTENSION, Sault Ste Marie, Mich.

Great Lakes Dredge & Dock Co., Chicago, Ill., has been awarded a contract for construction of a pier extension at St. Marys Falls Canal by U. S. Engineers, Detroit, Mich., at $569,397.

ROAD CONSTRUCTION, Mexico

State of Hidalgo, Pachuca, will construct and repair roads by its own forces. The estimated cost is $1,000,000.

GENERATING PLANT ADDITION, Beloit, Wis.

Cunningham Brothers, Beloit, have been awarded a contract for the construction of a 1-story 78x118-ft. brick, steel generating plant addition, by Wisconsin Power & Light Co., Madison, Wis. The estimated cost with equipment is $3,000,000. Sargent & Lundy, Chicago, Ill., are the engineers.

PAVING and LIGHTING AIRFIELD, San Bruno, Calif.

U. S. Engineers, San Francisco, Calif., awarded a contract for paving and lighting at San Francisco airport to Macco Construction Co. and Morrison-Knudsen Co., Inc., San Bruno, at $882,675.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 141.

OBITUARY

Daniel J. Linehan, 49, resident engineer of construction, Connecticut State Highway Department, died in New Haven, May 17. Mr. Linehan was graduated from an engineering school in Dublin, Ireland, and served in World War I with the British Army. He aided in the planning and construction of the Merritt Parkway and the Wilbur Cross Parkway.

Thomas Walker Owen, 58, former administrative engineer for the Federal Works Agency at Seattle, Wash., died in that city May 21. He was born in Detroit, Mich., and had lived in Seattle for 28 years. At the time of his death, he was employed as an engineer by the Boeing Aircraft Co.

George M. Rose, 28, administrative assistant for the Ohio River Division of the Army Engineer Corps in Columbus, Ohio, for three years, died May 17.

William McCormick, 66, assistant chief engineer of the Reading Co., died May 16 in Philadelphia, Pa. A graduate of Girard College, he had been associated with the railroad's engineering department for 40 years.

E. V. Bird, well-known Arkansas contractor, died at his home in Fayetteville, May 15. He was vice-chairman for the state license board for general contractors.

Fred W. Patterson, 85, the first road engineer for Allegheny County, Pa., died at New Brighton, Pa., May 16. He was formerly city engineer for McKeesport, and for many years was chief engineer of the Pittsburgh and Lake Erie Railroad.

Peter D. L. Lyall, 66, died in Montreal, Que., May 7. A veteran of the first World War, he was a construction engineer and built some of the most important structures in Winnepeg, Man.

Comdr. Harry LeGrand Hilton, 69, executive assistant to the 11th Naval District public works officer at San Diego, Calif., died May 20. In the Navy since 1917, Comdr. Hilton had retired in 1940 but was called back to active service a few months later. A civil engineer before joining the Navy, he was graduated from the Lawrence Scientific school at Harvard University.

Theodore Horatio Ellis, 78, of Summit, N. J., a retired civil engineer who devoted his professional career largely to the construction and operation of oil refineries, died May 26. Many of the fuel-oil stations serving the Navy around the world are of his design and construction, built when he was consulting engineer to the United States Shipping Board. During the first World War, Mr. Ellis served as a captain in the Engineers Corps.

Walter K. Monroe, 62, head of the Helena, Ark., office of the United States Army Engineers, died there May 22.

Robert A. McMahon, 47, general manager of construction for the General Maintenance and Engineering Co., Columbus, Ohio, died May 20. He was a graduate of Ohio State University.

Charles D. Kesler, 44, chief engineer of the plans and surveys section of the Oklahoma State Highway Department, died recently. He had worked for the department for 21 years.

Byron Hewitt, 59, Boone County surveyor and highway engineer at Columbia, Mo., died May 12.

C. C. Larsen, 80, head of C. V. Larsen & Sons, general contractors of Council Bluffs, Iowa, died at that city on May 23.

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Expansion of Cleveland water works proposed

Legislation permitting the initial step in a $15,000,000 program designed to expand and rehabilitate the entire water pumping and storage facilities of Cleveland, Ohio, is under consideration.

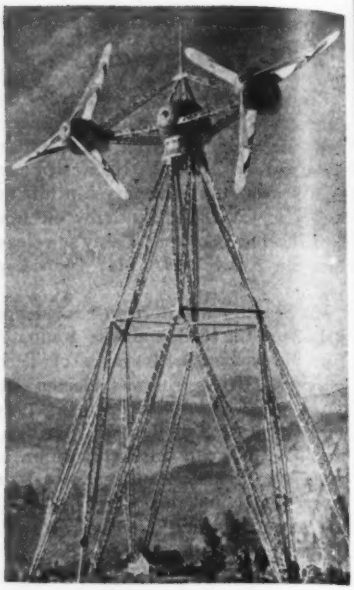
The ordinance authorizing Utilities Director Emil J. Crown to hire the firm of Havens & Emerson, consulting engineers, to begin an immediate survey of the probable future water supply requirements of Greater Cleveland, was introduced in the City Council May 22.

At the conclusion of the survey, expected to cost $30,000, the engineers will make recommendations and determinations of necessary additions and extensions of existing facilities.

The ordinance also provides that the firm of Havens & Emerson shall, at the conclusion of its survey, proceed to prepare plans and specifications totaling approximately $450,000.

The Week *In Engineering and Construction*

Continued on page 100



Huge wind turbine is designed by FPC

Extensive studies of the feasibility of electric power production by huge wind turbines was found so reassuring by the Federal Power Commission that two large units have been designed by that agency. One is the twin-turbine unit illustrated, which is expected to have a 6,500-kw. capacity in a 28-mph. wind, and the other is a 7,500-kw. turbine designed for installation where wind velocities are higher.

The unit shown consists of two turbine wheels mounted at the ends of a 200-ft. long structural steel bridge rotating on top of a tower 475 ft. high to the shaft of the wheels. The turbine wheels, which have blades of 40-ft. length, are geared to direct-current generators in the central generator room.

Advantages claimed for the turbines include: an unlimited supply of wind at any site found suitable for an installation; energy delivered free on the site by nature; no variation in cost can occur in the supply of the power; simplicity of operation and of structure; turbines can be widely distributed and located near load centers that are relatively distant from fuel and hydro plants, thus greatly favoring low transmission costs; and low construction and operating cost.

The design of the turbines was made by Percy H. Thomas of the FPC. He utilized data collected by the U. S. Weather Bureau in making his studies as to the power to be obtained from wind action over long periods.

It is to be noted that the FPC does not plan to construct the turbines.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

A Voice For All Engineers

Sir: Your editorial "A Voice For All Engineers" (*ENR*, March 8, vol. p. 307) has provoked considerable comment among professional engineers in this state, and it does seem that both the article by Prof. Harold E. Wessman on "A Unified Profession Needed," as it appears in the same issue of the *Engnieering News-Record*, and the editorial comment referred to do not appreciate the present thinking which has developed among a very large and significant segment of the professional engineers in this country.

Prof. Wessman is absolutely correct in saying that a unified profession is needed, and it was this urge that has put together now some twenty odd state professional engineering societies who in turn have decided that the National Society of Professional Engineers is the proper medium by which this unification of the profession may be realized. Reference is continually made to the one voice which now speaks for law and medicine in over-all welfare problems, and those of us who have investigated and pondered the problem can see no reason why a similar condition can not exist for the engineering profession. However, we are firmly convinced that the national representation of state interests must be the democratic outgrowth of state society representation which in turn speaks for the individual engineer so that there is a definite possibility of positive action on any level wherein it can speak with authority for its membership.

It is our belief that the American Engineering Council found its ineffectiveness in its lack of authority to speak when needed. The Joint Conference Committee undoubtedly would be desirable so long as the single authority or single voice is unavailable, but I know it is the belief of the professional engineers in Minnesota that N.S.P.E. represents this proper single voice. There is a clean cut definition of its membership in that all must be legally qualified professional engineers registered under their respective state laws and it is with the clear understanding that it is not the purpose of the over-all welfare society to in any way interfere with technical society activities.

The engineering profession has unfortunately, and unlike law and medicine, grown the branches of the tree to maturity (namely the technical societies) and is now in dire need of a proper trunk to support these already grown branches. The amelioration of present engineering interests will require the most broadminded approaches, the dismissal of any fettered thinking biased by historical prestige, jealousy or the like. A singleness of purpose for a "unified profession" coupled with an understanding and informed judgment of circumstances at hand can alone gain this objective.

In Minnesota, the Minnesota Association of Professional Engineers now has in its membership approximately 50 percent of those registered professional engineers now in this state. We represent in our membership numerous Founder Society members of A.I.E.E., A.S.M.E., A.S.C.E. and mining engineers The unmet need that banded us together irrespective of our different fields of activity was the need for a single representation on over-all engineering problems, the need for raising the standards of professional practice, including a fair return for proper professional service, the concern of the employed engineer that negotiations in the interest of his welfare proceed through representation of his own choosing, and preferably by men of his own kind, and finally that the general public be most effectively served and protected from incompetent practice to the end that the engineering profession may be placed in its earned position of respect.

Your editorial is quoted in part as follows: "Need for the National Society of Professional Engineers never has been convincingly demonstrated, * * *." If this inference is true, all of our convictions are false and we would appreciate being enlightened; but if our position is sound, then we feel that state professional engineering societies and its counterpart on the national level, the National Society of Professional Engineers, should be supported as the practical means for unifying the engineering profession in this country, which medium we have been actively searching for for the past 75 years.

S. L. STOLTE,
Professional Engineer
St. Paul, Minn.

Sir: The editorial in *ENR* March 8, 1945, "A Voice for All Engineers," prompted by Mr. Harold E. Wessman's address that appeared in the same issue, received a great deal of thoughtful attention at a recent meeting of Travis Chapter, Texas Society of Professional Engineers, Austin, Texas. This chapter is a part of the National Society of Professional Engineers, and most of the members are also members of the Founder or other engineering societies. Statements in the address and in the editorial were subjects of serious consideration, especially since the N.S.P.E. and the state sections of the other societies have worked together without thought or evidence of conflicting purposes.

The first reaction was that an injustice was done in connection with the manner in which the N.S.P.E. was mentioned in the editorial. However, further discussion brought a different light to bear on the subject and it was realized that it was probably just the same old and frequently reoccurring difficulty of misunderstanding the reason for the N.S.P.E.

The very reasons put forth by Mr. Wessman are the reasons for the existence of this society. It is not just another society but is the nucleus for an organization to give *all* engineers a common voice in national matters. It is an agency—a going and growing agency—which provides a voice that can and does speak for the engineering profession. It is the only agency that is in a legally qualified position to speak for the members of the engineering profession, as its members are all registered professional engineers according to the laws of the states in which they practice.

It presents an opportunity for one voice for the engineering profession as does the American Medical Asso-

ciation for the medical profession. True, there are many independent engineering societies, and rightfully so, for the advancement of technological engineering. Just so, there are independent medical societies for the advancement of various fields of medical practice. However, doctors are united in the American Medical Association and engineers are afforded a like means for a united profession in the National Society of Professional Engineers. Doctors are identified as licensed practitioners. Similarly, registration of professional engineers is now a fact in all but two states and the District of Columbia.

The legal status of engineers is, therefore, attested by registration. But, a united profession is needed! And the National Society of Professional Engineers is organized for this one outstanding purpose.

The editorial appears to intimate that the N.S.P.E. is presumptuous in assuming the prerogative of speaking for all professional engineers—as though it were attempting to encroach on some purpose of the older and larger engineering societies. The editorial states that N.S.P.E. should be represented on the new central agency, but then, N.S.P.E. should "abandon its purpose of being the spokesman for engineers on all matters of national interest."

Abandon its purpose of being spokesman? If that were done, no valid reason would remain for continuance of N.S.P.E. We admit that our society is not yet large and powerful, has only begun to attract national attention, has not been trumpeted so that none could fail to take notice and to understand. We admit, further, that study of our constitution does not clearly and distinctly reveal that our main purpose is to be spokesman for all scientific engineers, within all branches, in all political, economic and civic matters of significance to all the branches and all the members. Our constitution may need to be reworded so that this purpose stands out in bold relief from the other purposes which are common to numerous other societies, all of them good but, nevertheless, incidental to this one salient purpose that provides the reason for our existence.

Registration is the key to open the door for the united engineering profession. The only legal engineer is one who is registered. The N.S.P.E. is of and for registered professional engineers. The total number of registered engineers in the country is between 75,000 and 80,000, as attested by reports to the National Council of State Boards of Engineering Examiners. This alone should convincingly demonstrate the need for the National Society of Professional Engineers. The steady and sound growth of the N.S.P.E. in the ten years of its existence, the establishment of the N.S.P.E. in 22 states and the activity of its members is another demonstration.

The N.S.P.E. now has a joint committee with the National Council of State Boards of Engineering Examiners. This is a beginning which might well be followed by joint committees of the Founder and other engineering societies with the National Society of Professional Engineers.

An opportunity for a unified profession is sought. The opportunity exists and is well under way.

S. D. BREEDING
President, Travis Chapter
Texas Society of Professional Engineers
Austin, Texas

Sir: Professor Wessman and your editor (*ENR*, March 8, vol. p. 308 and 311) have missed entirely the fundamental basis of professional unity, namely, *legal qualification to practice engineering as a profession.*

Professor Wessman referred to the American Medical Association and the American Bar Association as examples of professional unity. He failed to point out that before we can have professional unity among engineers we must first have a profession. He failed to point out that no one can practice medicine or law in the U.S.A. until he has been legally qualified and licensed to do so. That is the fundamental basis of these professions, legal qualification. That is the fundamental basis upon which the engineering profession must be founded. That is the basis upon which the National Society of Professional Engineers is founded and I believe that it is the only one that will hold water.

Setting up another oligarchy of technical societies with their heterogeneous memberships of licensed and unlicensed engineers will not build either a profession or professional unity.

Until the engineers in the U.S.A. get their eyes open on this one point, they will continue to grope in the dark. To find an example of professional organization and unity among engineers one need only cross our northern boundary into Canada where they are miles ahead of us in their professional development and thinking. New York State is ahead of most of the other states in its thinking. It licenses engineers as "professional engineers" without reference to branch or specialty. That is what the medical and legal professions do.

I believe that your editor is correct in assuming that the National Society of Professional Engineers will continue for the simple reason that it is founded on true professional principles and it is the only society of engineers in the U.S.A. that is so founded. In addition it is founded on truly democratic principles. It is a "grass roots" organization.

WALTER H. WHEELER,
Professional Engineer
Minneapolis, Minn.

Remagen Bridge

Sir: In the March 29 issue of *Engineering News-Record* (vol. p. 416) appears an article on the Remagen bridge which states that this " . . . was a three-span continuous truss bridge . . . of the type that has an arched center span in which the floor is carried by hangars. (American structures of similar type, probably based on or influenced by the Remagen Bridge, include, among others, the Lake Champlain Bridge and the two highway crossings of the Cape Cod Canal.)"

The three American bridges mentioned were designed by Fay, Spofford & Thorndike, and were not influenced in any way by the Remagen Bridge. They are continuous truss bridges, and it is our understanding that the Remagen bridge was a tied-arch.

C. M. SPOFFORD
Boston, Mass.

[According to Karl Mohringer in his book, "The Bridges of the Rhine," the main span of the Remagen Bridge is a tied arch, as Prof. Spofford states, and not an arched center span of a continuous truss layout. Mogringer, moreover, suggests, but does not state directly, that a panel or two of the side span trusses, continuous with the arch trusses, are cantilever arms supporting the remainder of the side

spans as suspended sections. The Remagen Bridge was correctly labeled a tied arch in the first reference to it in *Engineering News-Record*, March 15, 1945, vol. p. 351—EDITOR.]

Nothing for Tribute

Sir: Your issue of April 5, 1945, carries an editorial concerning the payment made by contractors to union representatives in connection with the construction of New York City's Delaware Aqueduct.

This editorial and some articles in the country's newspapers infer that such payments are common practice with contractors, and that the costs involved are regular entries of cost in contractors' estimates.

Three cost estimates were made by our organization for the Delaware Aqueduct, our contract No. 316, at Newburgh, and for the Associated Contractors' contract No. 306, at Valhalla, New York. I handled the reconciliation of these estimates, and know that no allowance was made in any estimate we prepared for these two jobs for such expense.

For the past twenty-five years I have been directly concerned with bidding estimates for this company's work, and know that no allowance has been made in any of our estimates of cost, for payment to union representatives.

J. H. GILL
Vice President
Walsh Constructing Company, Cleveland, Ohio.

[We did not intend to infer that payment of tribute to racketeers is common. We said: "By implication, the meekness with which large contracting firms made these payments would indicate to the public that they are the rule rather than the exception." We know they are the exception. EDITORS]

Airplane Hangar at Sacramento

Sir: In *ENR* Feb. 15, 1945, vol. p. 288, you published a picture of a three hinged arch hangar fabricated by Stran-Steel Division of Great Lakes Steel Corporation. The article states that: "Plans and specifications were prepared by and work done under the supervision of the U. S. Engineer Office, Sacramento, Calif." This infers that the design was also done at that office.

I, not the U.S. Engineer office, Sacramento, Calif., was the designer of these hangars. Also the structural design drawings were made under my direction in the office of Stran-Steel Division Great Lakes Steel Corp.

The chords of the hangars are prominently mentioned in the article and I believe that the following should be added: The chord members were designed with batten plates instead of lacing. The principle of the Vierendeel Truss was applied. Tests were made which proved that the action of such properly designed composite compression members is the same as that of laced members. The work was done by me in Nov. 1943.

ARNOLD A. WEITZMAN
Architect and Engineer
Detroit, Mich.

Expansion Joint Elimination

Sir: For many years Seattle has been studying and experimenting with the spacing of joints in concrete pavement. Though in general the conclusions confirm and bear out the findings of the Oregon State Highway Dept. (*ENR* March 22, 1945, vol. p. 398), the following summary of the steps leading up to these conclusions may be useful to others.

Expansion joint spacing was 30 ft. in the first one-course pavement Seattle laid in 1916. Some 9 yr. later the standard for expansion joint spacing was reduced to 20 ft., this reduction being chiefly to eliminate transverse cracking of the panel due to shrinkage rather than to provide more expansion space. A better means of preventing transverse cracking, however, was found in the dummy joint which was used in Seattle in 1921 on longitudinal joints and has been used for transverse crack control since 1925. Early in 1926 expansion joint spacing was increased to 40 ft. alternating with dummy joints also on 40-ft. spacing, thus making the length of each panel 20 ft.

This 20-ft. spacing was too great to prevent shrinkage cracks and in 1926 expansion joint spacing was increased to 45 ft. and this length was divided by dummy joints into three 15-ft. sections. This spacing of dummy joints for crack control is still continued and is in all respects satisfactory. The distance between expansion joints, however, has continued to increase. Expansion joint spacing, that began at 30 ft., has been gradually increased until the present practice (on earth subgrades) is 300 ft. In 1927 an experimental section 456 ft. between expansion joints was laid. This section is in excellent condition after 18 yr. of service. Again in 1935 two runs, 640 ft. and 856 ft. long, respectively, were tried. After 10 yr. of heavy traffic these sections show no signs of undue stress. A third trial section, laid in 1937 on Dearborn St., has no expansion joints in a 3,900-ft. stretch. Because of the keying effect of the extremely rough surface of the concrete base on which this was laid prevented free movement of the slab, dummy joints for transverse crack control were placed only 10 ft. apart. This pavement has given highly satisfactory service.

Complete elimination of all expansion joints in all concrete resurface jobs is now standard practice and was followed in recent resurfacing of Second Ave. from Pike St. to Yesler Way, a total length of 3,300 ft. In the light of our previous experience with increasing spacings of such joints, we are confident that Second Ave. resurfacing will be satisfactory.

It is our belief, based on laboratory tests and field observations, that concrete has its maximum length when in the plastic condition in which it is laid and that climatic conditions that obtain in Seattle will never bring the concrete slab back to that length. If the space provided by the normal shrinkage while the concrete is hardening can be protected from the infiltration of foreign matter, this space will be sufficient to take care of expansion and no additional space need be provided. It is the failure to protect these openings formed when shrinkage takes place initially, that results in expansion trouble. Because of this, older pavements with close joint spacings may function for years and then blow up for no apparent reason.

In our opinion the major problem is not a question of providing *more* space than that made by the normal shrinkage of concrete in hardening but rather a problem of keeping this space free from foreign matter during the period of maximum shrinkage.

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EDITORIALS

VOLUME 134 NUMBER 22

May 31, 1945

Centralized Public Works

LARGE-SCALE REORGANIZATION of the executive branch of the federal government, as proposed by President Truman, may bring forth a new proposal to consolidate all federal construction operations in one department. Such proposals have been put forward in the past but have made little progress due chiefly to the opposition of the Corps of Engineers and the Bureau of Reclamation, neither of which agencies wished to surrender its independent status. Whether President Truman has centralization of public works in one agency in mind is not known as his reorganization plans have only been stated in broad general terms. If he does, he has one advantage over those who have put forward similar proposals in the past—the nucleus of a public works department now exists in the Federal Works Agency. Three organizations concerned with construction already are in that agency, the Public Roads Administration, Public Buildings Administration and the Communities Facilities Bureau. Nevertheless, transfer of other construction units to the FWA is not going to be made without opposition, and as there are sound arguments on both sides, the whole subject needs to be carefully considered before any decisions are made.

Many Small Jobs Needed

MOST ESSENTIAL at the present time are jobs that can start quickly. They need not be large, in fact the many small, deferred jobs that require only a few people, a small amount of equipment and ordinary materials are the ones that will do the most to alleviate local unemployment. The small jobs—sewers, waterline extensions, street repairs and the like—generally require a minimum of preliminary work and the materials they need will add only a small load to overworked transportation systems. Right-of-way problems generally do not complicate such work, nor is there need for delays while elaborate plans are made, reviewed and remade. Financing in general should be simple, as projects of this kind are essentially maintenance and extension rather than new work. These small jobs are just down-to-earth engineering but there are thousands of them that need doing *now*, which comprise a reservoir of really useful public works that in the aggregate represent a large amount of engineering construction. Experienced personnel, trained for accomplishment, now are being released from the military forces. These men need jobs, and projects of the kind outlined above require immediate doing. Here is a place to start while more elaborate projects are getting under way.

Greater Public Esteem

RECENTLY at a Congressional hearing in Washington a capable civil engineer holding a responsible position was criticized by the Senator serving as chairman because of the engineer's failure to speak with sufficient vigor to permit all of the small group present to hear. Unfortunately this is no isolated example. It is the rule rather than the exception when engineers appear in public. That fact needs to be recognized by those who complain so bitterly over public apathy toward engineers as a group. Their program directed toward public recognition must begin within the profession itself. Until engineers learn to look upon their own contributions as of such importance as to call for forceful and convincing presentation they cannot expect the public to hold their profession in high esteem.

Controlled-Access Highways

A QUESTION OF DEFINITION raised some months ago by H. O. Schermerhorn of the New York State Department of Public Works might well be cleared up in these days when highway work is limited chiefly to planning. His question relates to highways that are commonly called by a variety of terms such as "freeway", "expressway", "parkway", "superhighway", "thruway" and "boulevard" in various parts of the country. In recent years an attempt has been made to obtain acceptance of "limited-access highway" as the appropriate term to describe a highway with few points of access and with all crossings separated. Mr. Schermerhorn considers that a better term—a more descriptive term—would be "controlled-access highway". His point is well taken. The purpose behind limiting the points of access to predetermined points is not to keep traffic off the highway but to compel vehicles to use access points where their movements can be so controlled as to keep them from being a source of danger or delay. Controlled access would appear to be an appropriate enough term to warrant its being used more widely.

New Surplus Equipment

DISPOSAL of surplus *used* construction equipment seems to be well in hand under the program of regularly scheduled "spot sales" in the various districts conducted by the U. S. Department of Commerce. However, this plan cannot be continued into the field of *new* surplus machines, such as those remaining in the manufacturing and distribution "pipelines" at the end of the war, without creating chaos in the equipment production industry, and hence some new procedure will have to be developed.

For most industries, cessation of hostilities will mean that manufacturers must stop building war machines and reconvert to permit manufacture of their normal peacetime products, of which there will be a great scarcity. Such is not the case in construction equipment, for no reconversion is involved and there is no scarcity of most items. But as a consequence, even if only moderately large stocks of construction machines were thrown on the market in surplus sales, production of further machines would be greatly curtailed, seriously affecting employment and business in that field.

To meet this situation, the Power Crane and Shovel Association has recommended a procedure that warrants consideration. It is based on a plan already approved for use in the field of cutting tools whereby the manufacturers would act as agents for the government. They would sell the surplus new machines at predetermined prices, and pay for the equipment at a certain percentage of that price when each sale is consummated. Each manufacturer would agree to sell the surplus units at a predetermined rate of disposal based on the number of sales of new units he is currently manufacturing and selling at the time of disposal. Such a plan is urged as providing for orderly disposal with a minimum of disturbance to the manufacturing economy and employment.

The huge stocks of spare parts that are certain to be left over are even more of a problem. Here again, the association offers a solution. It recommends that one year's supply of spare parts be furnished from military stocks in this country for every machine left abroad destined for useful work. Spare sets of machine parts could also be offered with each surplus unit sold in this country, as these sets consist of emergency repair parts useful in any operation. Whether this procedure would absorb most of construction machine parts is, of course, not known until current military requirements are checked against existing depot inventories.

One big weakness of the Surplus Property Act of 1944 was its failure to provide for industry advisory committees to help solve the perplexing problems arising in respect to disposition of excess material and equipment. Despite this defect in the act, there is no reason why the Surplus Property Board should not seek advice from experienced persons in the various industries. Disposal of surplus new equipment will have the least harmful effect on the national economy if planned with the advice of men experienced in selling such equipment.

Stepping Up Construction

RELAXATION OF CONTROLS over construction does not mean that a large amount of construction can get under way soon because lack of key materials, such as lumber, will check any such trend. Details of the relaxation orders and of the situation with respect to materials are given in this issue. Study of them will show that many building operations still are impracticable even under the higher cost limits set by the WPB.

In some other fields the picture is not quite so dark. For example, a considerable amount of highway and airport construction could be put under construction. All restrictions on grading operations have been lifted, and supplies of bituminous materials and cement are in excess of military needs. Some reinforcing bars and mesh are available. Probably steel for forms can be had, and, anyway, highway contractors should have a large stock of used forms on hand. Concrete and tile pipe for culverts and underdrains are available. Bridge construction, however, might have to be postponed due to lack of lumber and to uncertainty about bridge steel.

No construction will be free of annoying difficulties. Yet, if construction is to occupy its proper place in the postwar economy, these should not be allowed to prevent the start of the greatest amount of work that can be initiated without injury to the war effort. Construction cannot carry its full share of the load after the war without a period of considerable length in which to mobilize its forces and train its new recruits.

ENGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor* **Copyright, 1945, by McGraw-Hill Publishing Company, Inc.**
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AN ENGINEERING NEWS-RECORD FOREIGN REPORT

Huge Port Built on Cherbourg's Wreckage

Waldo G. Bowman
Editor, Engineering News-Record
(From the European Theater of Operations)

***Contents in Brief**—Delayed by censorship since it was written last January, this article describes one of the greatest Engineer achievements of the war. Wrecked beyond anything we had expected, the port of Cherbourg was nevertheless developed to handle twenty-five times its peacetime capacity and four times the tonnage we had originally planned to put through it. Miles of pile-trestle wharfs and acres of LST and "Duck" ramps were involved, as well as repairs to docking basin gates and cleanup of mines.*

THE COMPLETE engineering story of Cherbourg in this World War will require two main chapters, one written by the Germans, the other by our Army Engineers and Navy salvage and mine-sweeping experts. It was the Germans who converted the well-known French port into a hard-to-take fortress, and then mined its waters and wrecked its docks to make our task of reconstruction both difficult and hazardous. So well, indeed, was this military mission carried out that the German commander received a special decoration from Hitler. So well was it done, in fact, that it took us three or four times as many days to get some of the main facilities back into service as the pre-invasion estimates had allocated.

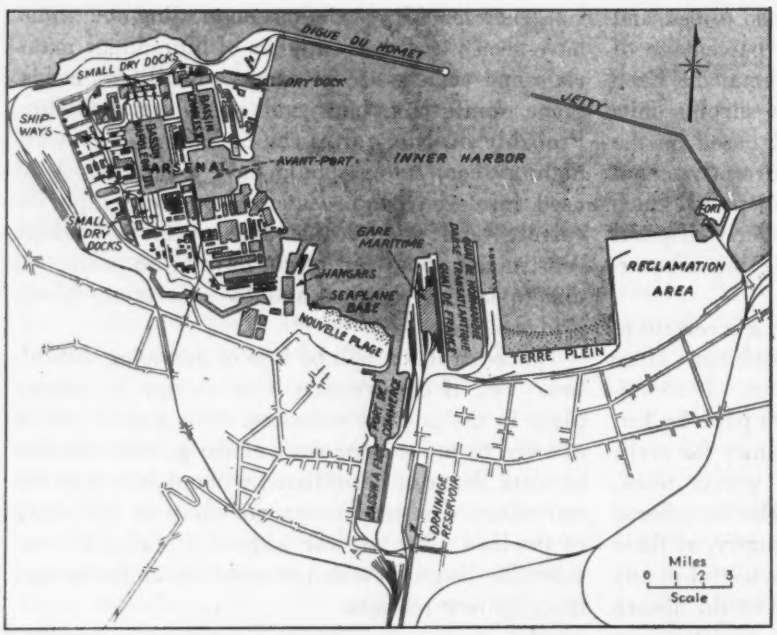


Fig. 1. In the port of Cherbourg the three principal areas where construction work was carried on are (1) the Terre Plein and Reclamation Area at the right; (2) the Darse Transatlantique and the Port de Commerce in the center; and (3) the Arsenal at the upper left.

How Cherbourg harbor was mined and blocked, and its shore facilities damaged will be the subject of the German chapter. But, while it will be a good one, the American chapter will be even better, for it will recount how we surmounted difficulties many times worse than we expected to make a peacetime passenger port and naval repair station into a cargo port with a wharf capacity, exclusive of landings for LST's and Ducks, of over 25,000 tons a day, or some four times what the pre-invasion plan called for. The Germans were good, but they were not good enough.

It is the purpose of this article to give some of the highlights of these two yet-to-be-written chapters, with particular emphasis on the repair and construction of the shore facilities as done by the Army Engineers. Involved was the building of nearly five miles of wharfs, mostly wood-pile trestle, some decked with plank, some with concrete; the paving of several hundred thousand square feet of beach for the use of landing craft and the amphibious trucks, the "Ducks;" the cleaning up of debris requiring millions of man- and machine-hours; and the handling of dozens of small but vital construction and rebuilding jobs.

By thus placing emphasis on the Army Engineer contribution it is not

Fig. 2. Construction work gets under way to convert damaged Cherbourg into a great cargo port. At the left is the wrecked Gare Maritime on the Quai de France, and at the right finger piers are being built from the Quai de Normandie out to the line of caissons that formed its edge. These piers were later joined into a continuous wharf. The same method of repair was used to replace the caisson-supported edge of the Quai de France.

meant to imply that it was more important than that of others to the success of the operation. Certainly, without the Navy work of salvaging and moving sunken craft and sweeping mines, the port could never have been used. And without the tremendous efforts expended by the Transportation Corps in getting supplies unloaded and moved through the port, the Engineer-built facilities would have been useless. These facilities did, however, represent the construction task at Cherbourg. Extensive and difficult, they were fundamental to the objective of making Cherbourg work.

Cherbourg, prewar, was not a big port, but it was a famous one because the largest of the trans-Atlantic liners docked there. In engineering circles, however, it probably enjoyed less fame than it deserved considering its history and the nature of its installations. As early as 1686, France's great engineer and builder of fortresses, Vauban, fortified Cherbourg at about the same time that he was introducing at Dunkirk the use of jetties to confine currents and thus scour entrances to a harbor. The famous French foundation pioneer, De Cessart, used floating cones or caissons in building the Homet jetty (Digue du Homet) about 1750. And finally in 1784, Napoleon's engineers started work on the 2¼-mile breakwater that forms the boundary of the outer harbor; in water 42 ft. deep at low tide, this huge embankment is 320 ft. wide at the base and 70 ft. high, and is said to have incorporated 3½ million cu. yd. of granite during the 115 yr. over which its construction and enlargement extended.

Gate-protected wet docks

At later dates, gate-protected wet docks were built in the port area to permit ships to unload regardless of the 23-ft. tide range. These were followed (1928) by the start of construction of two quays extending 2,000 ft. out from shore and outlining a berth or dock, the Darse Transatlantique, in which the largest ships could lie at low tide in 34 ft. of water. One of the quays, the Quai de France, was completed in 1933, and a large railroad passenger station, the Gare Maritime, erected on it to serve the ship passengers in starting their rail journey to Paris. The other, the Quai de Normandie, was completed for only half its length, although the caissons forming one side of the quay were sunk over the full 2,000 ft.

All these facilities, old and new, constituted Cherbourg. Destroyed or badly damaged by the Germans, they will require a major restoration or replacement job by the French. What we have done is to build over their wreckage or around it, but seldom to install anything better than emergency facilities of a temporary nature. Making Cherbourg work was not a job of rebuilding its dock facilities, but of using its landing spaces for improvised structures.

The construction work centered in three distinct areas around the inner harbor, as shown on the map (Fig. 1) from right to left: (1) The Terre Plein and Reclamation area; (2) the Darse Transatlantique and the adjacent Port de Commerce area; and (3) the Arsenal area. What was done in these areas was affected and determined by two factors, one close at hand—the nature and extent of the German demolitions—which might be termed a tactical factor; and the other far-removed—the strategy of supplying our forces through the ports of France.

The strategic factor was the more fundamental, since pre-D-Day planning to develop our biggest supply ports elsewhere had to be scrapped when General Patton's Third Army took advantage of the First Army

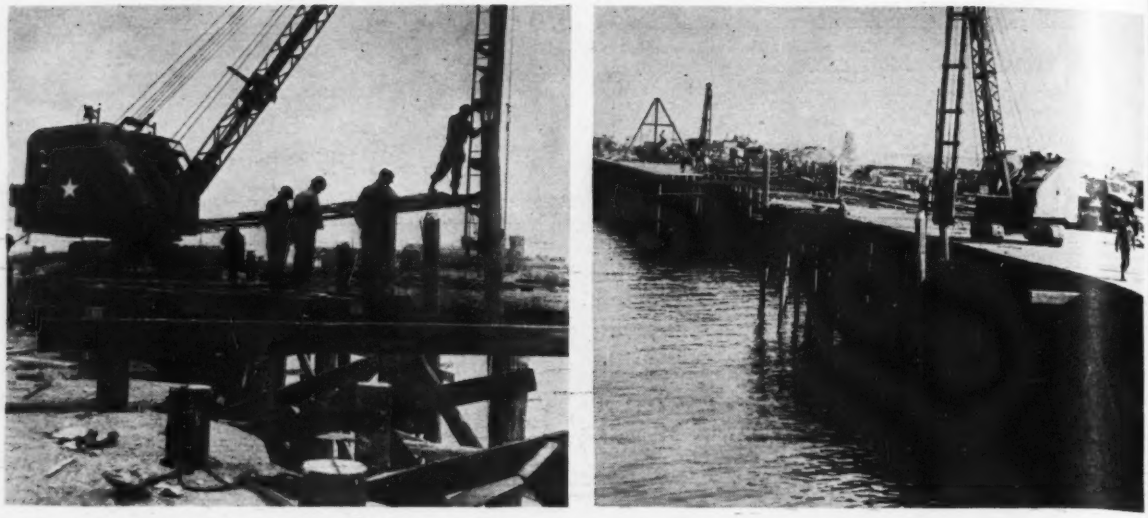


Fig. 3. Building the barge wharf along the Terre Plein that gave the port some immediate capacity regardless of German demolitions. Crawler cranes played a major role in its construction. Note how wharf was anchored to the shore by concreting the back row of piles into holes drilled in the masonry of the old seawall.

breakthrough at St. Lo and drove to Paris and beyond many weeks before such a possibility had been foreseen. Lines of supply from any place except Cherbourg would take too long to establish, particularly since the Germans were determined to hold the ports of Brittany as long as possible; as a matter of fact, as this is written, they still hold a good many of them, while the important ones that we captured—Brest and St. Malo, for example—are so badly wrecked as to be of little use.

Accordingly, Cherbourg, which had been scheduled for only about 7,000 tons a day, was required to plan for handling nearly four times that amount. It was here that the tactical factor came in, for the capacity had to be developed in those spots where the German effort to deny us the use of facilities had not been wholly successful. In the first place by sinking two ships across the entrance to the Darse Transatlantique, they had assured that this important dockage would not be available for some time. Moreover, extensive destruction of the caissons forming the east wall of the Quai de France and the west wall of the Quai de Normandie along the "darse" resulted in over 20,000 cu.yd. of masonry being blown into this ship berth, some of which, in pieces weighing as much as 90 tons, had to be removed. Finally, about a third of the reinforced concrete rigid frame superstructure of the Gare Maritime on the Quai de France was demolished by explosives and dropped onto the railroad tracks at the inshore end, requiring a major job of debris removal if these buildings and tracks were to be used.

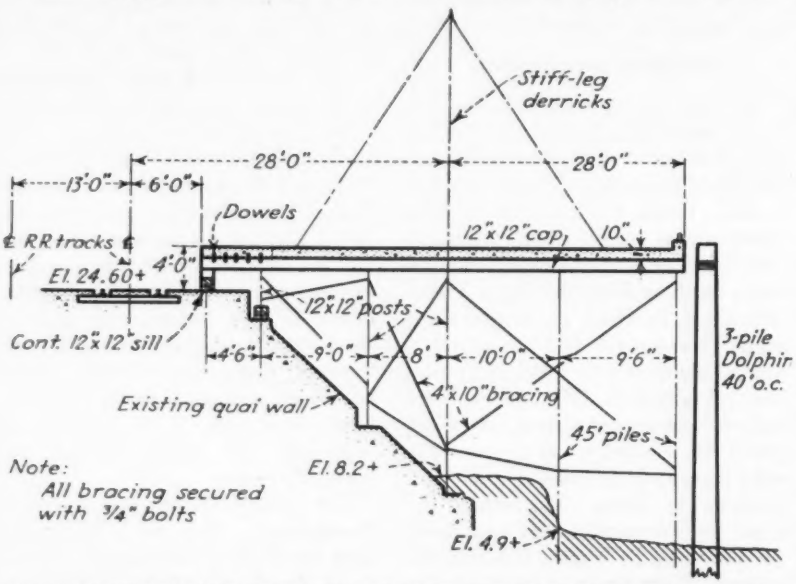


Fig. 4. Concrete-decked wharf was used along part of the Terre Plein to supplement the all-timber construction shown in Fig. 3. The deck is 10 in. thick and reinforced, top and bottom, with ⅝-in. bars.

Block ships in the nearby Port de Commerce basin and the entrance thereto, as well as destruction of the reinforced-concrete-framed wharf along the eastern side of the basin denied us the immediate use of these facilities situated in area (2), referred to above. And in the Arsenal area extensive removal of block ships and clearing of debris from the lock gates would be required before either Bassin Napoleon III or Bassin Charles X could be used as wet docks protected from the tides. There remained, therefore, as available for quick development only the Terre Plein and Reclamation area on the opposite side of the harbor; a beach, the Nouvelle Plage, near the commercial port; and the adjacent seaplane base.

Since these areas consisted of unimproved beaches and filled ground, they had suffered no damage. It was, therefore, decided to develop the

beach as a landing spot for Ducks, the seaplane base for LST cargo and the Terre Plein and Reclamation area for barge handling. Paving was required for the first two jobs, and timber wharf construction for the third; and, since captured German material was available, the work could proceed while the Navy was sweeping a mine-clear path through which other of our own construction supplies could be brought in.

In the meantime the more time-consuming and difficult jobs in the other areas could get underway, moving as fast as the necessary material and equipment supplies could be made available. Although we captured large stores from the Germans, including 10,000 bbl. of cement, fairly sizable quantities of form lumber and some construction machines, they were far from adequate, and it is important to note that our decision to develop four times as much cargo capacity at Cherbourg as we had planned made the suppying of building materials from the U. S. and the United Kingdom one of the crucial problems of the Battle of France.

It was in adhering to the tactical plan sketched above that the facilities described below, in approximately the order in which they became available, were constructed.

Duck landing station

On the Nouvelle Plage or "new beach," peacetime recreation spot of the local populace, accommodations for landing and unloading amphibious trucks were built. For the most part this was merely a concrete paving job involving about 160,000 sq. yd. of 6-in. slab in roads and turn-around areas. In addition, however, holes had to be cut through the seawall at the back of the beach for road exits, and finally, to speed up the operation of transferring cargo from the Ducks to trucks, two platforms, 150 ft. long and 40 ft. wide, with 32-ft. long ramps at either end, were built in the paved area. These platforms consisted of earthfills, about 3 ft. high, deposited between concrete retaining walls and covered with a reinforced concrete slab. The Ducks discharged their loads onto these platforms and went back for more, while men on the platforms sorted the cargos and moved them onto trucks as they backed up to be loaded.

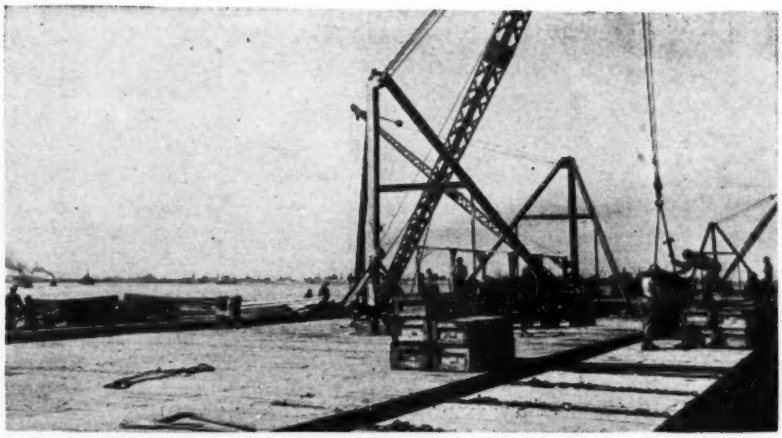


Fig. 5. Stiffleg derricks set back-to-back on the Terre Plein wharf were able, together, to cover nearly a full circle in swinging cargo from barges directly to flatcars on a track that ran along the rear of the wharf platform.

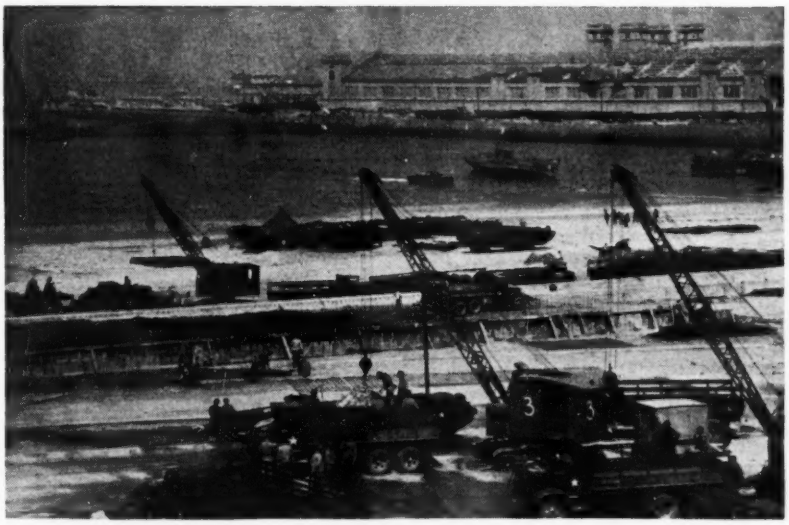


Fig. 6. Building a platform, a paved fill between retaining walls, onto which the amphibious ducks could land their cargos for transfer to trucks.

The seaplane base work consisted principally of enlarging the existing concrete ramps, although at one LST landing rail had to be laid to the water's edge and concreted in so as to unload freight cars (Fig. 7).

Wharf for barges

Along the Terre Plein and the Reclamation areas where an existing retaining wall had not been damaged, 4,200 ft. of timber wharf was quickly built to serve barges plying back and forth to ships anchored in the harbor. Supported on wood pile bents, the deck is 42 ft. wide, extending 30 ft. out from the face of the masonry wall to reach reasonably deep water, and 12 ft. landward to be adjacent to a railroad siding laid at the back of the wall. This layout placed the landward pile of each bent over the wall and, by digging holes in the masonry into which short piles could be set and concreted, an effective means of tying the wharf to the shore was developed. The other piles, about 45 ft. long, were driven by a drop hammer in leads suspended from a crawler crane boom.

The deck framing and pile bracing of this type of wharf is indicated in Fig. 4. Cargo, as shown in Fig. 5, was lifted from the barges onto the wharf or directly into railroad cars by stiff-leg derricks set in pairs, back to back, so that between them they had nearly a 360 deg. reach. Such pairs of derricks were set at 256-ft. centers along the full length of the wharf.

Fig. 7. Laying rail on an LST ramp for the handling of freight cars. The track was carefully laid to grade, inclosed in forms and concreted in solid. After this had set the remainder of the ramp was paved to the same level so that it could be used by wheeled vehicles.

With Ducks and barges taken care of, facilities for Liberty ships and other deep draft vessels came next on the list. Despite extensive German demolitions, the Digue du Homet, the jetty forming the west arm of the inner harbor inclosure, which was built by De Cessart nearly two centuries ago, was the most adaptable location for speedy development. Craters blown in the jetty extended from 20 to 30 ft. back from the face of the precast concrete block wall, and had first to be filled with earth or bridged with timber trestle. Next, "finger piers," or short (33 ft.) lengths of wharf, spaced to coincide with the hatches on Liberty ships, were built so that the facilities could be used immediately. Later, as opportunity offered, the wharf was made continuous.

Stage method questionable

This stage method of pier construction was also used on other wharfs in the harbor, but experience in attempting to unload ships while pile driving and other work was going on made it highly questionable whether any time was saved over building a continuous wharf in the first place. The Digue du Homet wharf carries railroad tracks so that its deck framing and pile layouts are much more complicated than for the barge wharf.

The worst crater on the Digue du Homet was at its inshore end. Here what may have been an underground gasoline storage vault was blown, creating a hole 402 ft. long, 70 ft. wide and 45 ft. deep. The masonry walls at both sides were toppled outward into the sea so 22 ft. of water washed across the jetty at high tide.

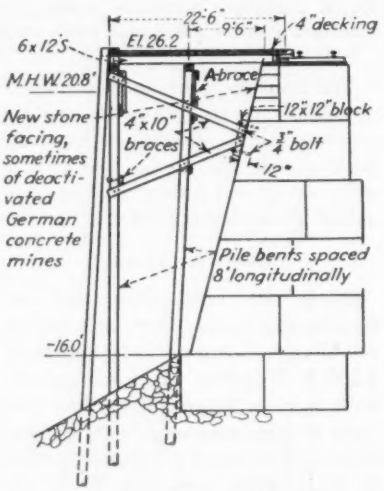


Fig. 8. Typical details of the deepwater wharfs used along the Digue du Homet and in the Arsenal basins and the battleship dock where the construction had to be fitted to a sloping quay wall.

The method of repair was to construct a form on either side of the "digue," consisting of timber walls resting against steel beams or railroad rails set vertically and tied together across the "digue" with steel cables. Within this form, bulldozers, working at low tide, built up and compacted a rubble fill. At other places along the "digue" and around on the adjacent quay near the large drydock, these same kind of forms, with the cables tied back to deadmen, were filled with concrete as shown in Fig. 9.

Basin repair and remodeling

As shown on the map (Fig. 1), the harbor facilities included a number of basins whose quays offered a good many hundred feet of ship unloading space. Three of the basins—Charles X and Napoleon III in the Arsenal and A'Flot in the Port de Commerce—were wet docks protected from tide action by lock gates. These gates could be put to full use as soon as the Navy removed numerous sunken ships and barges. The Avant Ports or entrance basins to the Arsenal and the Port de Commerce were subject to tidal action, but could be used for shallow-draft vessels after being cleaned of block ships.

The task of preparation varied in

different basins. In the Port de Commerce entrance the quay, which had consisted of reinforced concrete framing carrying a concrete deck, had been thoroughly wrecked. It was impossible to drive timber piling through the debris even with the steel shoes that were used for such locations, and the only alternative was to shore up and reinforce the old supports and framing. This required meticulous examination of every beam and column, rebuilding of cracked joints with concrete and the replacement in steel or wood of broken members. A 55 x 1,260-ft. wharf was planned here, but very little of it was built because it was found that substitute facilities could be provided more quickly elsewhere.

Some of these facilities were constructed in the Arsenal basins where wharfs were built despite a rather extreme batter of the wall face. It will be noted from the map that a number of shipways and drydocks are entered from Bassin Napoleon III, and since these were of no use the openings were closed by wharfs in line with the rest of the quay so that the entire basin was ringed with unloading space. It may be noted that pending the building of wharfs along sloping basin walls, Navy lighterage barges, made up of Seabee pontoon units, were moored between the ships and the wall, and rendered efficient service as a floating wharf onto which cargo could be transferred before being lifted over the quayside.

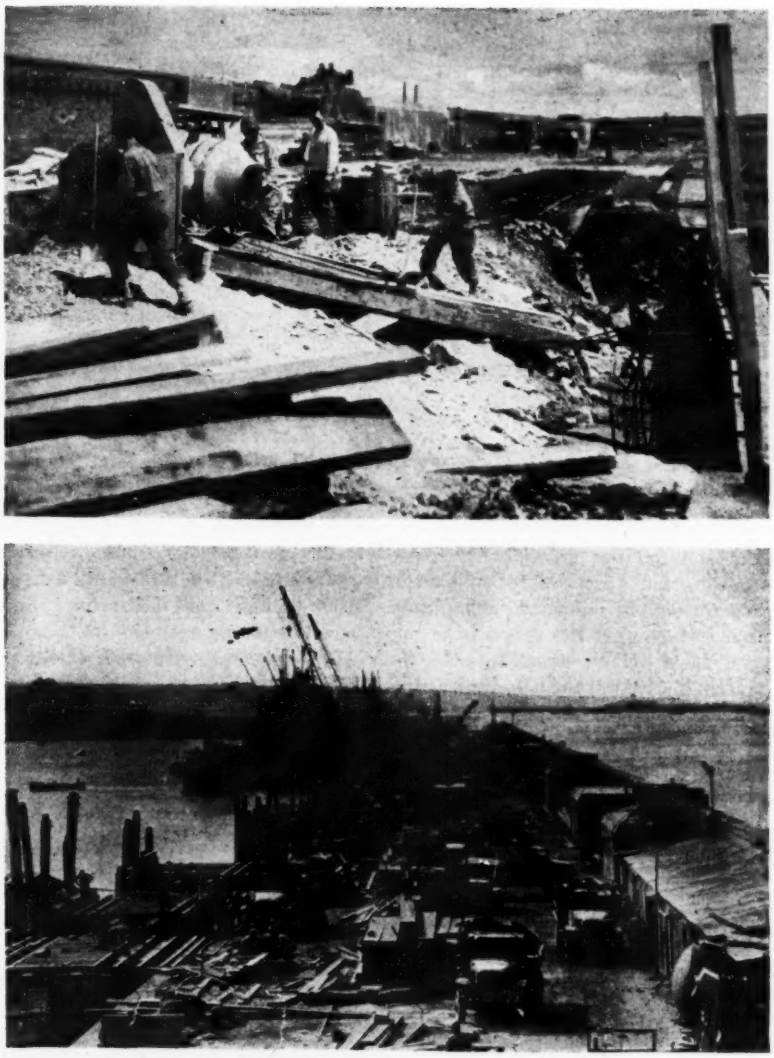


Fig. 9. Two views of the work of rebuilding the Digue de Homet into a deepwater wharf. At the top a blown out face of the wall is formed and filled with concrete, while at the bottom, finger piers are being built out from the wall, spaced to fit Liberty ship hatches. Later the fingers were connected into a continuous wharf. Note the German pillboxes along the seaward side of the "digue."

Using the ocean liner quays

The best berthing space in the harbor was the great deepwater dock (2,000 ft. long, 750 ft. wide and from 35 to 45 ft. deep at low tide) known as the Darse Transatlantique located between the Quai de France, which carried the railroad terminal, and the Quai de Normandie. Recognizing this fact, the Germans exerted their best efforts to render it useless, first by sinking ships across the entrance and then by wrecking the quays on either side, dropping as much debris as possible into the dock.

Both quays are of similar construction—sand fills between mounds of large stone, with concrete caissons 100 ft. long by 20 ft. wide and 70 ft. high above the bottom, forming a continuous wall along the "darse" side against which the deep-draft ocean liners could tie up. A cross section of the Quai de France, showing also the concrete-pile-supported concrete superstructure of the deck and railroad terminal, is reproduced in Fig. 10 from an earlier article, *ENR* July 6, 1944, vol. p. 4. The Quai de Normandie was similar except that only the first 1,000 ft. had been finished; in the second 1,000 ft. at the outer end only the caissons for the wall were in place and these had not been entirely completed.

The method of destruction was effective, alternate caissons on both quays being toppled into the "darse," while the concrete deck extending from the caisson walls back to the quay fill was completely demolished. Here, again, we resorted to timber wharf construction, some with a 10-in. concrete deck to take 35-ton crawler cranes, some with a timber deck carrying railroad tracks.

As the first construction operation, trestle was built in the openings in the caisson wall so as to provide a continuous support for the outer edge of the new wharf. This trestle was then expanded, initially as a series of finger piers at Liberty ship hatch-spacing, and finally into a continuous wharf. On the Quai de France the new wharf deck, accommodating both railroad tracks and trucking roadways in its 100-ft. width, covered the area back to the Gare Mari-

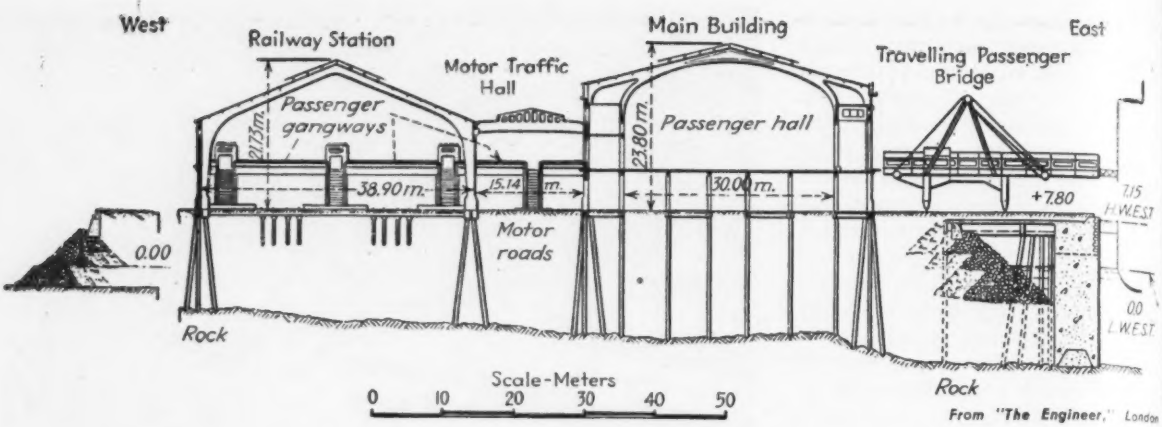
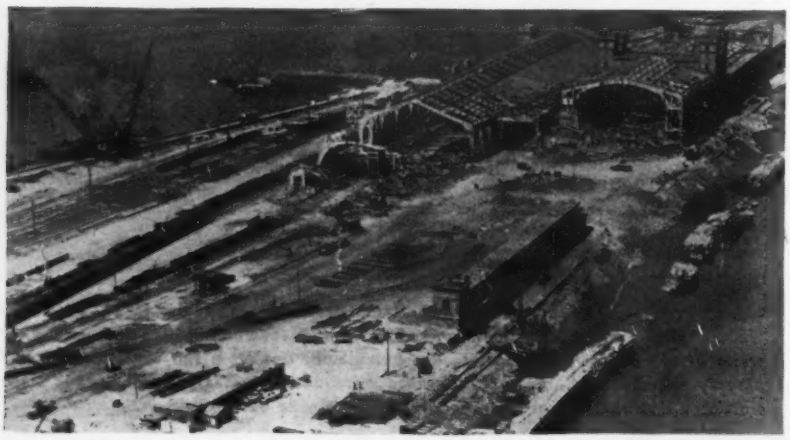


Fig. 10. Cross-section of the Quai de France on which the Gare Maritime is located. Berthing facilities for deep-draft vessels were provided by sinking concrete caissons outside the wharf of the original mole (right).

time on the east side. The railroad station itself was rendered difficult of restoration by German demolitions that had dropped the debris from several bays of the structure onto the tracks, but we were able to remove this so that trains could come in to bring wounded to hospital ships.

On the Quai de Normandie the new deck extended the full width over the 1000-ft. long quay fill inshore, but a new pile trestle extension at the outer end incorporating the line of old and badly wrecked caissons was made only 80 ft. wide. The east side of the Quai de Normandie wharf was actually an extension of the barge wharf skirting the Terre Plein and the Reclamation areas, although truck instead of rail haulage was used to serve it.

The building of all of these facilities in fast enough time to keep supplies rolling to the front after the invasion beaches were slowed down by weather and before other and better ports were available was a great achievement. By D + 90, seventy days after the capture of Cherbourg, the port had a wharf capacity, exclusive of LST and Duck landings, of 13,000 tons a day measured on the basis of a ton of cargo per foot of wharf per 24 hours. Much more capacity could have been made effective but for the unexpected difficulty of clearing the waters of mines and block ships, yet the figure attained was about twice the preinvasion estimate of what could be done with a port having a



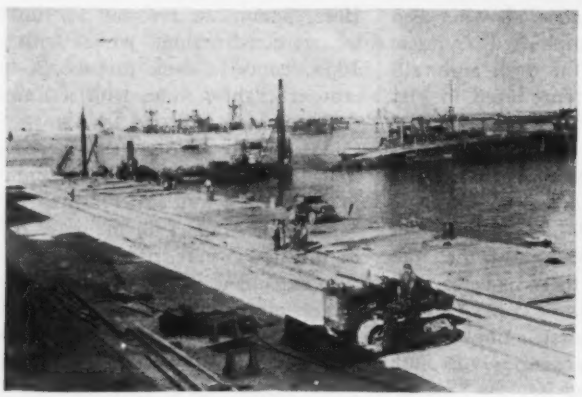


Fig. 11. Wreckage of Quai de France (top) was reclaimed by building a timber wharf over the debris along the edge (bottom, left) and by clearing away the rubble so that hospital trains could enter the station (bottom right). The scuttled ship in the left view (foreground) represents a near-successful attempt by the Germans to block the entrance.

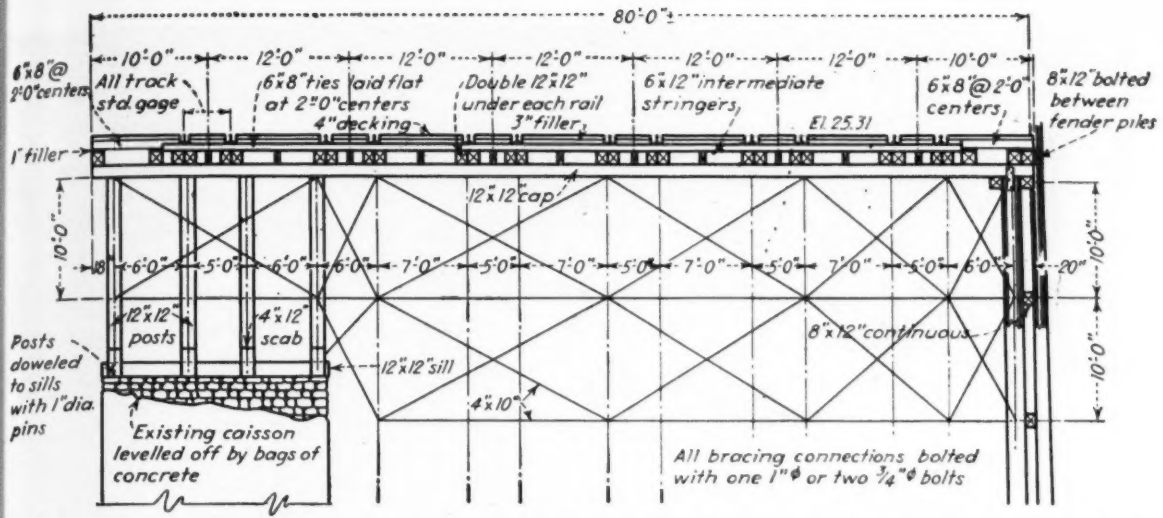


Fig. 12. Details of trestle construction used to extend Quai de Normandie beyond its peacetime length utilizing the line of caissons that had been put in for a future extension when the qual was built. This same type of construction with the edge opposite the caissons supported on the fill was used along the inshore edge of the Quai de Normandie and also along the east side of the Quai de France.

peacetime capacity of only about 1,000 tons a day.

In carrying out the work some 320,000 piles, varying in length from 35 to 100 ft., and 9 million ft. b.m. of squared timbers were used, and latest figures indicate that 500,000 sq. ft. of timber-deck wharf and 125,000 sq. ft. of concrete-deck wharf have been built. The vast tonnage of debris handled, and the meticulous jobs of removing obstacles and mines are not, of course, measurable in statistics. And no mention has been made of a multitude of other tasks in the immediate vicinity, such as the building of two railroad yards involving the moving of 350,000 cu. yd. of earth and the laying of 30 miles of track, or the construction in 12 hr. of a 4,600 x 120-ft. pierced steel plank runway at the airport so that gasoline could be flown up to the front. Yet all of these things added together constituted a great Engineer achievement. They were what made Cherbourg work.

Credit for what was accomplished at Cherbourg is spread so widely among both Army and Navy personnel that it is impracticable to mention more than a few names. Maj. Gen. Cecil R. Moore, as chief engineer, European Theater of Operations, had top charge of the work, which was begun, the day after the port was captured, by the Advance Section, Communications Zone for which Brig. Gen. E. G. Plank was commander, Col. C. H. Chorpening, deputy commander and Col. E. C. Itschner, engineer.

Colonel Chorpening was in charge of the port development until July 10 when the Cherbourg Command, under Col. Theodore Wyman Jr. was created to take over. It operated under General Plank's "Adsec" until July 31 when the Normandy Base Section was established. Colonel Wyman was appointed commander, and it is generally agreed that his energetic planning and direction were instrumental in the success attained. Engineer for the Normandy Base was Col. E. G. Herb, and the construction was done by the 1056th Engineer Port Construction and Repair Group, commanded by Col. J. B. Cress, the group being made up of general and special service regiments and other units to the total of about 20. For the Navy, Commodore William A. Sullivan was in charge of the vital harbor cleanup work.

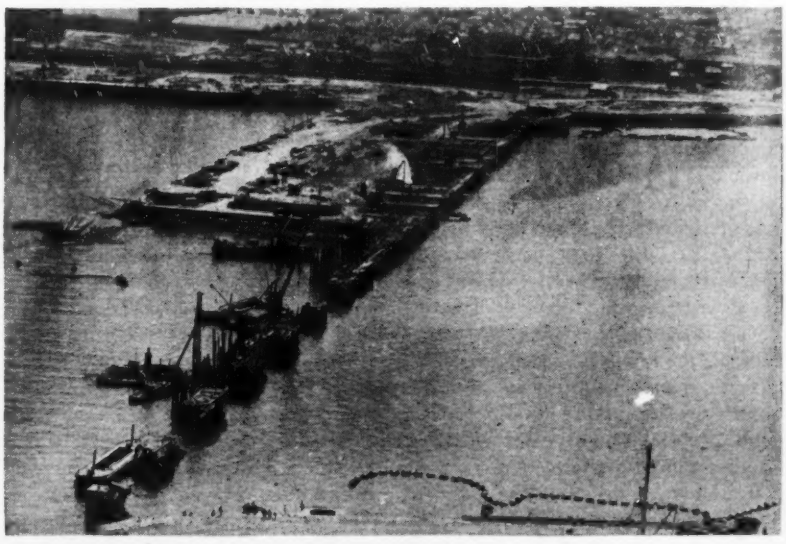


Fig. 13. Extending the Quai de Normandie, using the line of caissons that the Germans attempted to destroy. Pile driving is underway at three locations—by a crane working out from the quai and by two floating drivers working outward from the one-third points of the extension.

U. S. Army Engineer photos.

Fig. 1. Prisoners-of-war use wheelbarrows for preliminary grading of the Mississippi River model at Clinton, Miss.

Hydraulic Model of the Mississippi

***Contents in Brief**—Complex problems relating to the coordinated operation of flood control reservoirs in the Mississippi River basin will be studied by means of a large-scale model now under construction at Clinton, Miss. Scheduled for completion after the war, this 200-acre working model of the Mississippi River drainage area represents 1,244,000 sq. mi. It is being built with prisoner-of-war labor at an estimated cost of $3,000,000.*

CONSTRUCTION OF THE LARGEST hydraulic model ever built in the world is under way at Clinton, Miss., where the Corps of Engineers, U. S. Army has completed 25 percent of the preliminary grading of a scale model of the entire Mississippi River basin and its tributaries. Estimated to cost $3,000,000, this model is being built to a horizontal scale of 1 to 2,000 and to a vertical scale of 1 to 100. It covers an area of some 200 acres measuring 4,500 ft. in an east-west direction and 3,500 ft. in a north-south direction. It will also have a 50-ft. vertical range in the elevation of the ground surface.

Initiated by order of the Chief of Engineers, U. S. Army, this hydraulic model is being built by the U. S. Waterways Experiment Station, Vicksburg, Miss., under the supervision of the President of the Mississippi River Commission. At present only grading and drainage work is being carried on, using prisoner-of-war labor working with wheelbarrows and hand shovels, or operating trucks and tractors.

Visual and effective means of study

Chief purpose of the model is to provide a visual and practicable means of studying the operation of reservoirs in the basin which have been built or are proposed. A major problem is the release of stored waters. A full or nearly filled flood control reservoir is a liability. The release of stored water at a time when such release could synchronize with a flood in a main stream, might increase rather than prevent flood damages. The model will give a visual demonstration of the best methods of operation and indicate those things which must be avoided in reservoir operation to prevent serious consequences. Since there are built or contemplated some 200 reservoirs estimated to aggregate about $1.5 billion in cost, operation poses an extremely complicated problem.

All main streams within the 1,244,000 sq. mi. of the Mississippi River watershed will be represented on the model. This area, which extends from Montana to Texas and from the Rocky Mountains to the Appalachians, includes all or part of 28 states or 41 percent of the total area of the United States. In addition to the Mississippi River, the Ohio, Tennessee, Missouri, Arkansas, and Red rivers will be built into the model along with their principal tributaries. These river systems have an aggregate length of over 15,000 mi.

The total length of rivers built into the model will be nearly 8 mi., actual measurement. The lower Mississippi River, which is nearly one mile wide and varies from 50 to 150 ft. in depth, will be scaled down in the model to a width of 30 in., and to a depth of 6 to 18 in. All existing and proposed flood control reservoirs as well as levee systems, dikes, floodwalls, floodways and other pertinent works will be reproduced. The model river channels including over-bank flow areas back to the levee systems will be

molded in concrete. All intervening ridges and valleys will be covered with sod.

Using data obtained from past records, floods of known magnitude will be reproduced in the model and their courses recorded by some 1,700 sensitive electrical recording devices. These will represent 1,500 gaging stations now operating on the various rivers, and outlets from 200 existing reservoirs.

Water for operating the model will be controlled by mechanical measuring equipment electrically operated from central control points. More than 1,000 gal. per min. will be required to operate the model. This amount represents, at the scale of the model, a slight excess over the maximum recorded flood in the lower Mississippi River. A circulatory system will be installed to permit re-use of the water employed in running flood control tests.

After considerable preliminary investigation the site at Clinton was chosen as being the most suitable for construction of the model with the least amount of grading. Construction was started in August, 1943, and completion of the entire model is estimated to require one year after certain needed materials become available following the war.

Graded to match contours

In the first rough grading operations for molding the site, topography of the watershed was taken from a small-contour map of the United States prepared by the U. S. Geological Survey. This map contains contours at 500-ft. intervals up to a 2,000-ft. elevation, and at 1,000 ft. above. No terrain above El. 5,000 ft. will be reproduced in the model, as the construction of high mountain ranges would add nothing to the effectiveness of operation and at the same time would entail considerable unnecessary expense.

Contours between those shown on the small-scale U.S.G.S. map are interpolated, using data from the 1:62,500-scale quadrangle maps prepared by the Geological Survey to get elevations in the stream valleys. The contour map thus prepared becomes the base grading map for the model area. Actual grades for the model will be obtained from larger-scale river maps prepared by the army engineers. Although current earth moving is called "rough grading," the area is being built up to within 1.0 ft. of final elevation. To secure proper topographic relief the fills and cuts over the entire area are governed by a com-

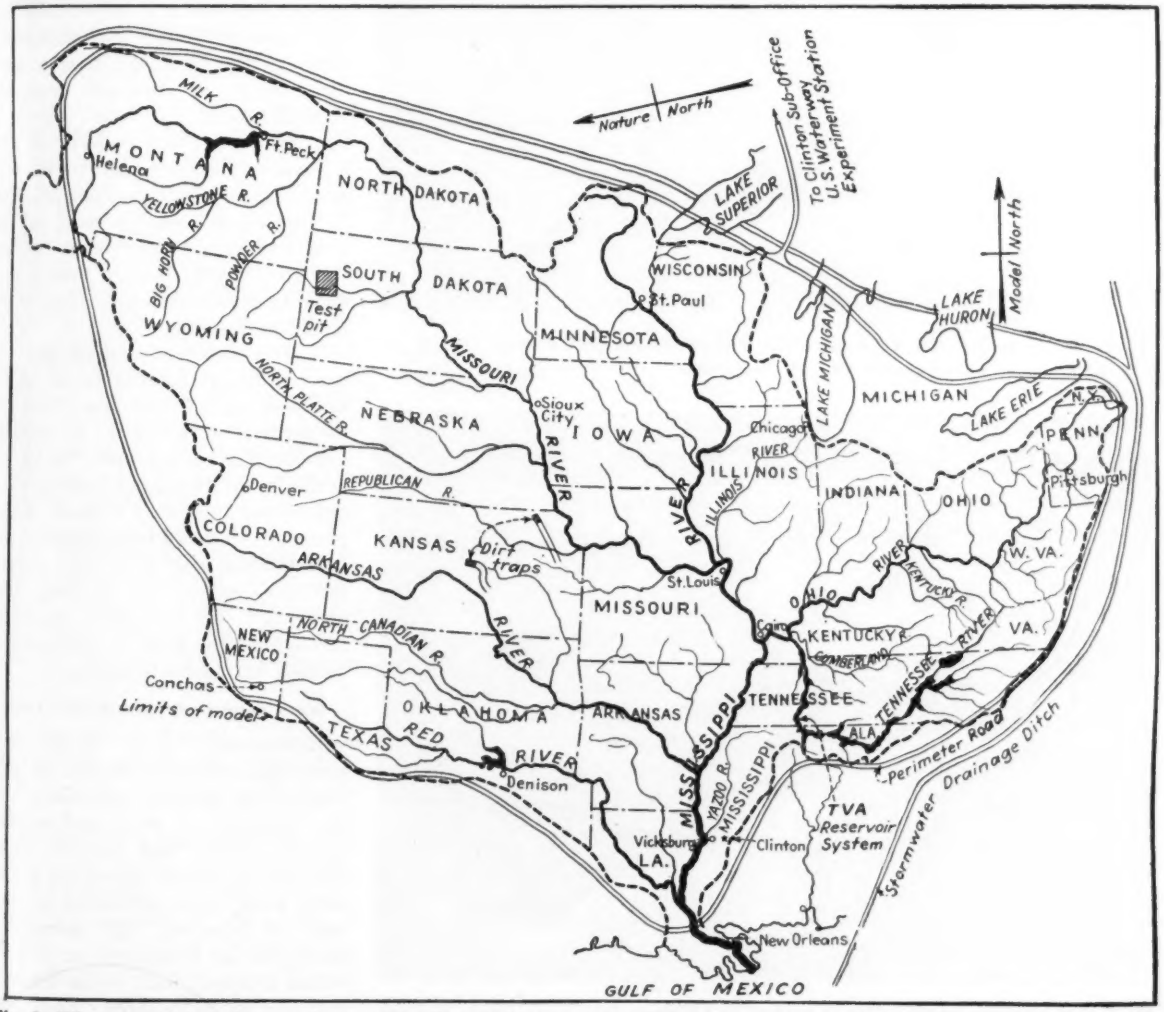


Fig. 2. When completed, the working model will contain a scale reproduction of the Mississippi River and its tributaries representing 1,244,000 sq. mi. of drainage area contained in 28 states.

prehensive grid system of "blue-top" stakes set 100 ft. apart each way.

One large problem connected with the project is the collection and disposal of stormwater falling within the limits of the 200-acre model. Intense rainfall, if permitted to run off unchecked, would do considerable damage to the working model. Consequently, provisions will be made to trap the natural rainwater runoff at each point where a tributary enters a main stream. Stormwater will be collected at these points and carried off through 28,000 lin. ft. of concrete drains from 8 to 60 in. in size.

In keeping with the war effort, earth moving equipment used on the job consists entirely of units declared obsolete. They are secured from the Surplus Equipment Division of the U. S. Treasury Department. Present equipment includes two 5-cu. yd. and one 8-cu. yd. scrapers, four bulldozers, several Caterpillar tractors, some sheepsfoot rollers, sprinklers, dump trucks, earth plows and rippers, and one ½-cu. yd. dragline.

Fig. 3. Stormwater interceptor ditches were hand-excavated and sodded by prisoners-of-war working under a "task" system.

Fig. 4. For long hauls excavation is pushed by bulldozer into dump trucks through timber loading traps adjacent to stockpiles.

824,000 cu. yd. of excavation

Since one of the primary objectives of the project is to utilize a maximum of prisoner-of-war labor, all earth fill requiring less than a 500-ft. haul is moved by wheelbarrows. Mechanized equipment is used for moving all other excavated material. An estimated 824,000 cu. yd. of excavation will be required for construction of the model. Of this amount, 40 percent will be moved by wheelbarrows and 60 percent by mechanized equipment. An additional 50,000 cu. yd. of excavation is contained in drainage ditches outside limits of the model.

First operation, upon starting the project, was to cut a 100-ft. wide fire lane encircling the 200-acre area. Timber framed guard towers were constructed at frequent intervals throughout the fire lane. The area then was cleared of underbrush and a temporary service road constructed around the site. Upon completion of the project the service road will be converted into a permanent "perimeter road" with viewing towers provided to enable visitors to observe the model in operation.

A large intercepting ditch also was constructed, by hand labor, along the east and south boundaries of the site to control stormwater. It contains four reinforced concrete "drops" to minimize the amount of excavation required and to control erosion. Scrap pieces of bar-and-rod portable airfield landing mats were used as reinforcement to save critical steel. Also, temporary ditches were excavated throughout the area to take care of rainfall during construction.

Work done on a "task force" basis

Exceptionally good results have been obtained with the use of prisoner-of-war labor by organizing both the wheelbarrow work and sodding operations into "task forces." Under this plan an area is staked out for the day's work to be performed by each crew of laborers. Fill material is stockpiled by bulldozers or scrapers within a 500-ft. haul of the limits of the area to be covered. Each crew then must haul by wheelbarrow

enough material from the stockpile to cover a designated area to a depth of 8 in. When this has been accomplished the day's work is done regardless of whether it has taken 8 hours to perform the task. Relatively poor progress was made with the work until this program was finally put into operation.

Daily working areas for each prisoner-of-war crew are based on the moving of about 4 cu. yd. of dirt per man per day. This was determined at the start of the "task force" program by employing a group of negro laborers to see how much dirt they could move by wheelbarrows within 8 hours. Working areas are staked out 50 ft. wide, measured parallel to the stockpiled material. Their lengths are varied, on a sliding scale, depending upon the distance of haul from the stockpile. An ordinary day's schedule includes about 250 prisoner-of-war operated wheelbarrows.

Compaction of new fill

After each 8-in. lift is completed, it is sprinkled and disked to secure the proper moisture content, and compacted to 95 percent maximum density of optimum moisture content. Sheepsfoot rollers, used for compaction, are filled with a paste mixture of barium sulphate and water to give the required weight. Five passes of the roller usually give the required compaction. Following compaction, the areas are smoothed with a grader, ready for the next lift. Rigid control of all compaction is maintained by a soils analysis laboratory erected on the site, supplemented by field tests as the work progresses.

All fill material required to be moved more than 500 ft. is transported in trucks which are loaded from timber loading-traps built flush with the ground. The trucks operate in a depressed runway excavated below the traps. Earth is brought in by scraper and stockpiled adjacent to the loading traps, from where it is bulldozed onto the trap and into the trucks.

Permanent stormwater drain ditches are sodded, using the "task force" principle in which a day's quota for an average 25-man detail includes cutting, loading, unloading and placing of ten 3-ton truck loads of sod per day. Although most of the large mechanized earth-moving equipment is operated by civilian em-

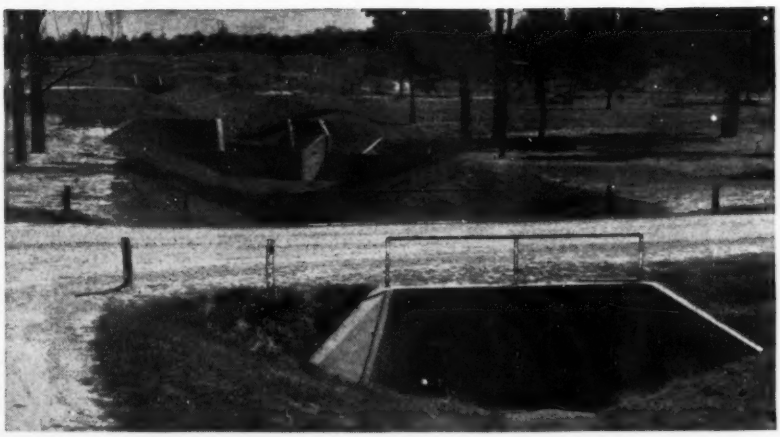


Fig. 5. Concrete "drops" reinforced with scrap pieces of portable airport landing mats were installed in a stormwater interceptor ditch on the perimeter of the model area to control erosion and minimize excavation.

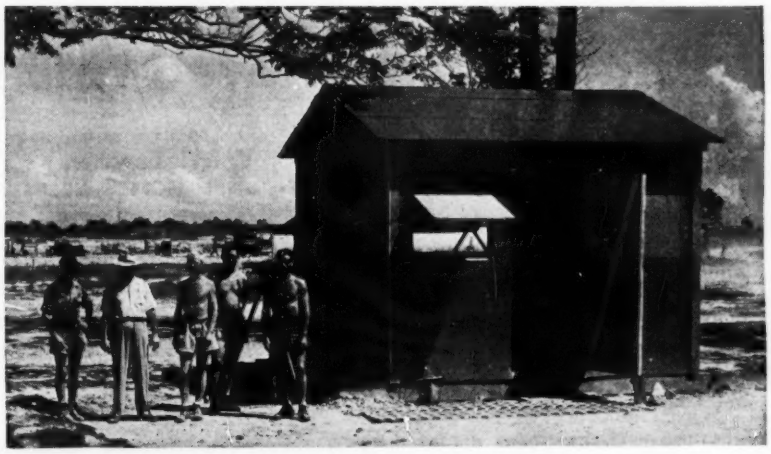


Fig. 6. Soil compaction is controlled by a testing laboratory erected on the site and operated by a civilian inspector and prisoner-of-war technicians.

ployees, some prisoners-of-war are used as relief operators. They also drive the trucks. Others serve as carpenters, blacksmiths, mechanics, surveyors, draftsmen, cooks and bakers. Each receives 80 cents for an 8-hr. day's work.

The model will not necessarily have to be completed in its entirety before partial operation is started. The Ohio River basin section is scheduled for completion first with other sections to follow as data are available.

Due to the distorted scale to which they will necessarily be built, all river channels in the model will require considerable adjustment for roughness to control the velocity and rate of discharge. Such roughness will be molded into the concreted river channels, based on trial and error methods and using experience gained in model operation at the U. S. Waterways Experiment Station. Woven wire fabric and triangular shaped pieces of perforated masonite have been used to simulate willows and other vegetation currently found in such localities. Similar artifices will be required at Clinton.

Engineering personnel

All construction is under the direct supervision of G. H. Matthes, director, U. S. Waterways Experiment Station, Vicksburg, Miss., reporting to Brig. Gen. Max C. Tyler, president, Mississippi River Commission and division engineer, Lower Mississippi River Division. Capt. H. G. Dewey, Jr., is in charge of construction operations. Karl A. Dupes is in charge of planning the model and P. E. McMillan is chief of construction.

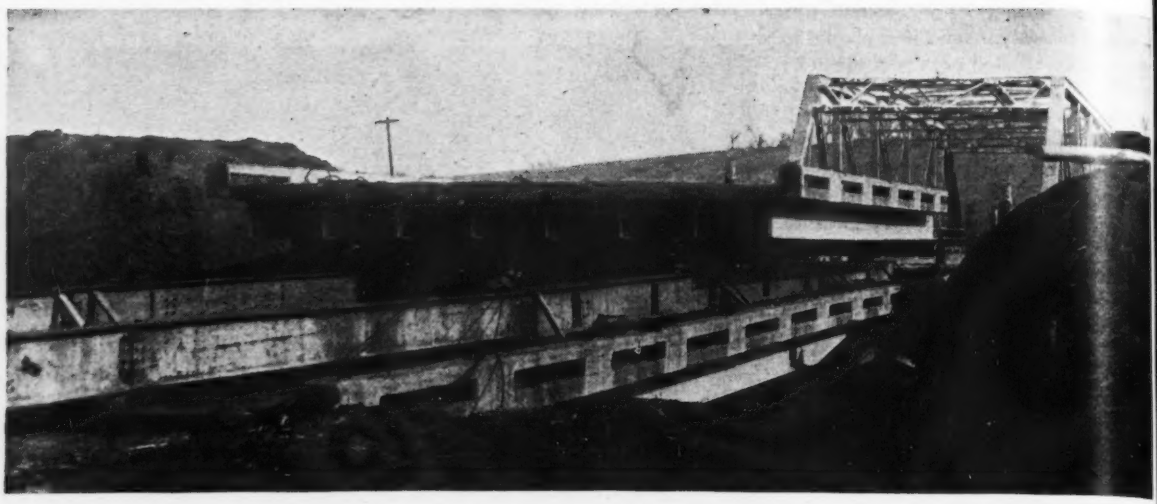


Fig. 1. To accommodate increased height and changed alignment of a levee this skew bridge was raised and shifted.

Bridge Spans Moved to Bank for Raising

V. W. Enslow,
Bridge Engineer, Missouri Highway Department

***Contents in Brief**—I-beam spans were rolled ashore and out of the way while higher supports were prepared for a bridge in Missouri. The skew truss main span was raised by jacks set under the end floor beam with principal reactions taken by a temporary beam attached to the truss pin shoes.*

MOVING APPROACH SPANS out of the way while driving piles to support the bridge at a higher elevation was an interesting expedient adopted on some recent construction in Missouri. The change was necessary to accomodate an increase in levee height at a bridge over the Little Tarkio River on U. S. Route 275 in northwest Missouri.

Before alteration, the crossing consisted of three 40-ft. I-beam spans on one approach and a single 120-ft. truss span over the channel. The I-beam spans were supported on creosoted timber pile bents and the truss was carried on concrete piers, founded on timber piling.

The principal bridge work in the alteration was raising the truss span and two of the 40-ft. beam spans 10 ft. vertically, and dismantling the

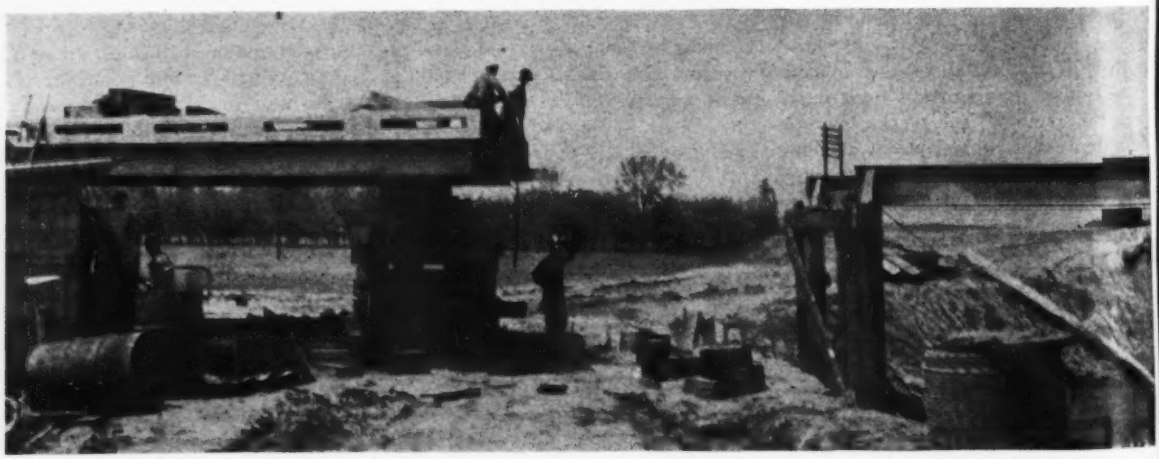


Fig. 2. Two of the beam spans were raised on the bank to the required elevation, then moved back to position over the I-beam runway erected on pile supported bents.

third I-beam span, moving it across the river and re-erecting it for the opposite approach. The old concrete caps were removed and the piers extended in concrete to the elevation required for the raised truss span. New creosoted timber pile bents were required for the I-beam spans.

Spans rolled landward

The ingenious plan of moving the beam spans out of the way and onto higher ground was devised to expedite and simplify the driving of the new supporting bents. The beam span adjacent to the truss was raised sufficiently to permit placing an I-beam runway under the span as shown in Fig. 1. The beams in the runway were supported on the old pier, and on the deck of the landward I-beam span. Roller nests were set between the runway beams and a 14x14-in. timber, placed transversely under each end of the 40-ft. span. From this position the span was pulled to high ground by a power hoist.

A similar operation was performed for the second span and the two spans were raised to their new elevation while on shore. The end one of the three 40-ft. spans was dismantled by removal of the concrete deck and the beams transferred to the opposite approach for re-erection in the new position and rebuilding of the concrete deck.

With the deck structure entirely out of the way, the existing bents were easily removed and the piles for the new supporting structure driven and capped. The beam spans, in raised position, were moved back over an I-beam runway to their permanent location as shown in Fig. 2.

Skew truss span raised vertically

Falsework piling was necessary for raising and supporting the truss span during the time the concrete piers were being rebuilt. Some of the piling was driven through holes cut in the concrete floor of the main span. This driving was done from the deck of the bridge before moving the beam spans to facilitate operation of driving equipment.

Due to the fact that the bridge was skewed it was necessary to keep both ends of the truss span at practically the same elevation during the raising operations to avoid racking. The end floor beams of the span were not designed to resist the forces that would be encountered in raising and the member at each end was reinforced with an I-beam (A in Fig. 3) fastened directly over the end floor beam.

Fig. 3. Lifting was done by hydraulic jacks working against an auxiliary beam "A" that transmitted the force to the trusses.

The added beam was attached by a U-shaped strap—(Fig. 4) of 6 in. by ⅝-in. plate "threaded" under the truss shoe pin. At the top, a short section of a 6-in. H-beam was rivited into the U-strap to complete the link. Web stiffeners were welded on the webs of both the end floor beam and the cross beam, directly over the point where the lifting force was to be applied. A steel shim, (C in Fig. 4) was driven tightly between the concrete floor and the lifting beam, thereby completing the arrangement for lifting a total dead weight of about 380,000 pounds.

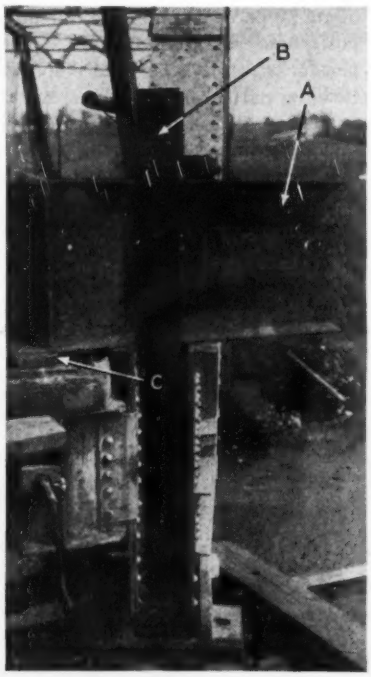


Fig. 4. The 6 in. x ⅝-in. U-shaped plate B was threaded under the truss shoe pin to transfer the load to the lifting beam. A steel shim "C" transmits the force applied to the floor beam.

Piers extended

Actual raising was done by hydraulic jacks set under the end floor beams just inside the truss shoes. After the truss was raised to the approximate final elevation, support was shifted to the timber falsework, capped with steel beams. The timber cribbing was removed and the concrete pier extension made, after which the load of the truss was returned to the pier top.

The work was performed by the Missouri Highway Department in cooperation with the authorities of the local drainage district. For the highway department C. W. Brown is chief engineer. J. L. Brown is division engineer and J. H. Beavin, division construction engineer. H. L. Williams was project engineer in direct charge in the field. Design of the alterations was under direction of the author.

Construction was done by the firm of Otto W. Knutson of Kansas City, Mo. with Mr. Knutson in charge.

Uruguayan Multiple-Purpose Dam Will Double Country's Power

L. F. Harza
Consulting Engineer
Chicago, Ill.

Luis Giorgi
Director General
Rincon del Bonete Project Uruguay

***Editor's Note**—First important hydroelectric installation in Uruguay, the Rincon del Bonete project, located on the Rio Negro, will more than double that country's power supply. It will also serve two other purposes—flood control and navigation. Except for about 305 ft. of earth fill with concrete core at the east end, the dam is all concrete. It is 3,846 ft. long and at the high point 137.4 ft. in height. More than 1,200 ft. of the tallest portion has a round buttress head deck with spread footings to minimize unit foundation load on poor quality rock. (The first of this type, the Don Martin Dam in Mexico was discussed in* ENR *Jan. 16, 1930, p. 101. An improved design, used in the Las Virgenes Dam, also in Mexico, was described in* ENR *May 17, 1945, vol. p. 714.) An unusual technique of "multiple grouting" of the foundation of the dam will be described in a forthcoming issue.*

THE FIRST HYDROELECTRIC installation of any importance in Uruguay, the Rincon del Bonete project on the Rio Negro will have an ultimate installation of 180,000-turbine hp. and 128,000-kva. generator capacity. This will more than double the present power supply of Uruguay, where the government enjoys a monopoly of power generation and distribution.

The project was begun in 1937 under a contract with an agency of the Uruguayan Government—the "Comision Tecnica y Financiera de las Obras Hidroelectrical del Rio Negro" (Rione)—by a syndicate of German engineers and equipment manufacturers and Buenos Aires contractors. When the war started, the dam was about 90 percent completed, including powerhouse foundations, intake gates, penstocks, scroll cases and embedded turbine parts but no work on the powerhouse superstructure except the operating house at the end. The remainder of the turbine parts and also the generators and other electromechanical equipment were largely if not entirely, completed in Germany. But delivery was impossible.

In July, 1942, relations with the German syndicate were discontinued and a loan of $12,000,000 was concluded by the Uruguayan Government with the U. S. Export-Import Bank to permit the re-purchase of machinery, equipment and materials in the United States. However, at first only one unit of four ultimate generating units and one of two ultimate transmission lines, at a cost of about $4,000,000, were permitted to be bought. The remainder of the project was to be completed after the war. Subsequently, however, the second generating unit was authorized.

U. S. engineers and manufacturers took over in July, 1942, where the Germans left off, and all equipment for the first unit and one transmission line is nearing completion in the United States. The equipment for the second unit, but not for the second transmission line, is on order.

Project economically justified

A question may be raised as to the justification of this expenditure of materials and manpower during this critical war period. However, Uru-

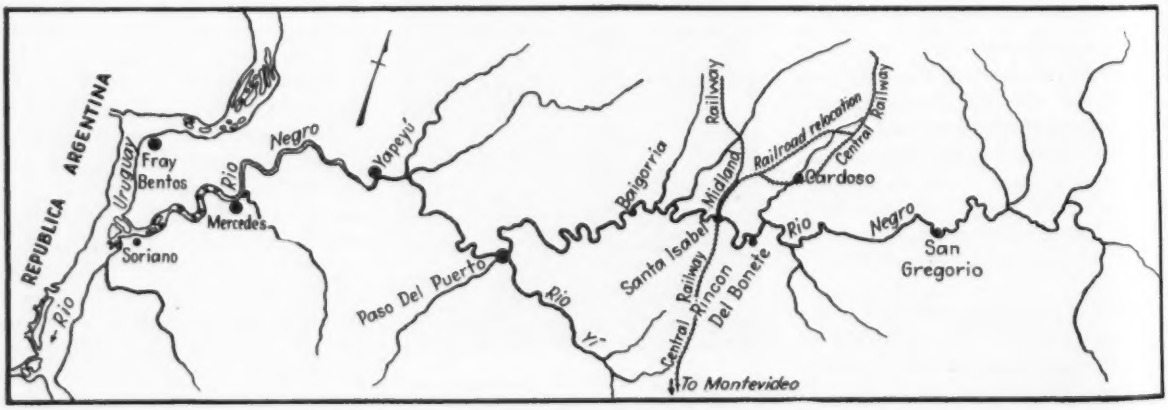


Fig. 1. Located near the geographical center of Uruguay, on the Rio Negro, Rincon del Bonete project will more than double the present power supply of that country, as well as provide for flood control and navigation.

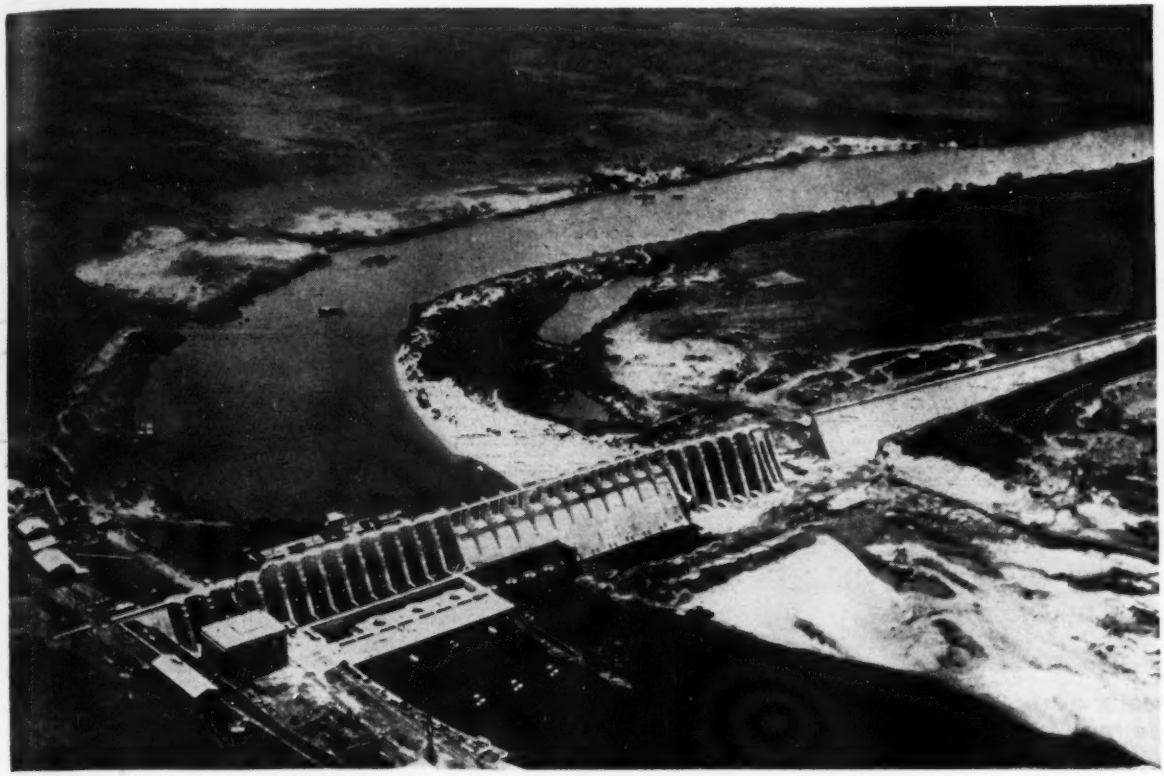


Fig. 2. At the left (west), in this view of the Rio Negro Dam from downstream, buttresses mushroom to form the deck.

guay is a prairie state without any fuel of her own, not even timber, and is dependent normally upon fuel oil shipped in American tankers, not now available. Since the war began, the Montevideo steam stations, in common with those in Buenos Aires, have had only very restricted allotments of fuel oil and have been dependent largely upon corn, wheat, sunflower seeds, and linseed oil, together with such coal as is occasionally available.

Corn and wheat for fuel

The Uruguayan stations have burned large amounts of corn, but one of the two large steam stations in Buenos Aires is alone burning enough wheat each day to feed all of Belgium and Holland and part of France. In view of such economic waste, it seems reasonable to expedite a hydro project so nearly completed, the first unit of which will relieve about 70 percent of the consumption of fuel in Montevideo.

The hydro project is located near the geographical center of Uruguay on the Rio Negro, which flows in a southwesterly direction from the Brazilian border on the northeast to the Rio Uruguay on the west (Fig. 2). The drainage area at the dam site is 14,600 sq. mi., and the initial effective head will be about 92 ft., with provision for a possible ultimate increase of about 10 ft.

Ultimately, four generating units, each consisting of a 45,000-hp. Kaplan, adjustable blade turbine, driving a 32,000-kva., 3-phase, 50-cycle, 13,800-v. generator, will be installed. Power will be stepped up to 161,000 v. for transmission over ultimate duplicate lines to Montevideo, about 145 mi. distant, there to be connected into parallel operation with the existing 90,000-kw. steam stations.

The average annual rainfall on the drainage area is 45.4 in. However, run-off is subject to erratic variations with the seasons, and especially severe droughts occur at intervals of a few years, a fact that may account for the absence of forests in areas other than along river banks. Therefore, storage of the water for control of flow is important.

At the initial elevation of reservoir, its surface area will be 443 sq. mi., and with a planned draw-down of 28 ft, the available storage, neglecting evaporation, will be 4,860,000 acre ft., a very large storage capacity useful toward regulation of flow. This reservoir will ultimately be used through about 160 ft. of additional fall at dam sites already chosen between the tailwater of Rincon del Bonete and the Rio Uruguay. However, the full economic value of the storage will not be realized until the lower projects are built.

Round buttress heads form deck

About 137.4 ft. high, the dam has a total length of 3,846 ft. and is all of concrete except 305 ft. of earth dam with concrete core at the east end. It is founded upon a basaltic lava of varying degree of soundness. For the highest section in the river bed, where the foundation loading would otherwise be greatest and where the rock is of poorest quality, a hollow dam of round buttress head type with spread footings (after Noetzli) was adopted to minimize the unit foundation loads. To form the round heads, buttresses 6.6 ft. thick are mushroomed to a thickness of 41 ft. This type of construction applies to the powerhouse intake, the spillway and a bulkhead portion with lengths, respectively, of 289 ft., 533 ft. and

Fig. 3. On the upstream side of the dam the wings of the buttress heads have been omitted and the buttresses extended to provide five openings for river diversion during construction.

405 ft. Except for short transitions the remainder of the dam, 2,308 ft., is of gravity design at each end of the hollow section.

The first few of the buttress heads to be poured developed superficial shrinkage cracks, tending to defeat the theory of this design. Thereafter, cooling coils were placed in the center of each buttress head, causing the center to cool as rapidly as the exterior, thus avoiding further cracks.

A 1-in. space, left between buttress heads, had been sealed with a copper U-strip. This space was recently dry-caulked with cement mortar to prevent any tendency of buttresses to spread as the result of water pressure in the shrinkage cracks. This is believed to be a complete remedy.

Unusual multiple grouting

Because of the imperfect quality of the foundation, thorough grouting was of utmost importance. Grouting was done in two lines of holes spaced four meters, or about 13 ft., apart in each line and staggered with reference to the holes in the adjacent line. The net spacing is thus about 8 ft.

Grouting was done in steps, each of 13-ft. depth. Holes about 3 in. in diameter were drilled with calyx shot drills to a depth of 13 ft. below the concrete cut-off and grouted. As soon as sufficiently hardened, the holes were re-drilled and re-grouted to final refusal, sometimes requiring several cycles. The holes were then extended 13 ft. deeper and again grouted, this time with a rubber packer to limit the grout to the newly drilled extension of the hole. This process was repeated until the total depth of about 80 ft. below foundation was completed.

This multiple step grouting and the results obtained are the subject of a forthcoming article.

River diverted through dam

Five openings for passing the river during construction were left under the spillway portion of the hollow dam by omitting the wings of the buttress heads at the bottom. Also, in an upstream direction to serve as closing piers the buttresses were extended and provided with stop-log grooves.

Closing could not safely start until about December because of seasonal river stages and a railroad relocation of about 16 mi. which could not be completed until that time. In December blocks of concrete were poured behind the protection of stop-logs into these five wedge-shaped openings (about 25 ft. high by 35 ft. wide), the last one while water passed through the three, then unused, turbine penstocks, scroll cases and draft tubes.

In addition to the 93-mi. length of the reservoir, the Rincon project for 300 days per year will provide a 7-ft. minimum navigation depth from the dam to the confluence with the Rio Uruguay, 245 mi. away.

Boats by-pass on railroad

Present traffic is in small boats of 110 gross tons, which will be transferred from tailwater to reservoir, or vice versa, on a railroad car, wedge shaped in elevation. Pulled to the summit of the ridge by a cable hoist (Fig. 3) the car is then swung around on a turntable and lowered into the water on the other side. Provision has been made in the gravity dam for ultimate construction of navigation locks if the traffic ever justifies the expenditure.

It is expected that the Rincon hydro station and the Montevideo steam stations will jointly generate, when completed and operated in parallel, an average total of about 530 million kwh. per year, of which 90 percent will be hydraulic. The consumption is now 300 million kwh., and the first hydro unit will produce about

00 million, thus relieving the steam tations of about two-thirds of the resent fuel problem.

Uruguayan urged dam since 1904

The Rio Negro project was first onceived and promoted in 1904 by he Uruguayan engineer, Victor B. udriers, who has fathered it since hat date and is vice-president of the oard of directors. Various investigaions, reports and estimates have been ade by Uruguayan and foreign enineers since 1909, when daily stream low records were first inaugurated. The final study, general plans and pecifications upon which the project as financed in 1937 were prepared y Professor Adolfo Ludin of Gerany. From date of financing, the roject has been ably prosecuted under the management of Luis Giorgi, irector general, formerly dean of ngineering at Uruguay University, nd a staff and board of directors of ormer professors and students. E. Terra-Arocena is chairman of the board.

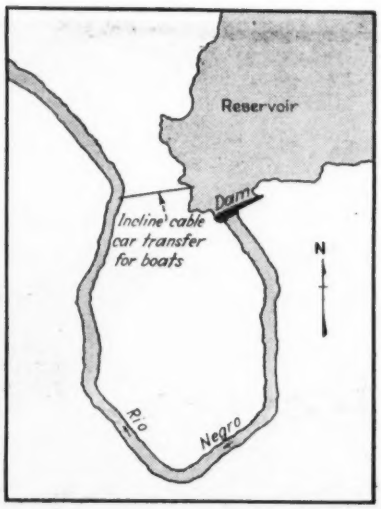


Fig. 4. Boats will be transferred from tailwater to reservoir on railroad car pulled by cable hoist.

In the United States, S. Morgan Smith Co. is completing the first two hydraulic turbines to fit the embedded parts as already installed. The International General Electric Co. is supplying the two generators; the Westinghouse Electric International Co. the transformers and switchgear for generating station and for sending and receiving substations, as well as transmission line insulators; the General Cable Corp. the transmission line hollow H-section conductors and the powerhouse and substation cables; the U. S. Steel Export Co. the transmission towers, powerhouse and switchyard steel, railroad rails, boat transfer car and miscellaneous steel.

The Harza Engineering Co. of Chicago, Ill., is completing the design of the project, the specifying and purchasing, inspection, and expediting and shipping of equipment. The interests of the Uruguayan government have been represented first by Juan C. Rezzano and, for the later part of the work, by Luis A. Cagno.

Bureau of Standards Investigates Vinsol Resin Cements

The National Bureau of Standards has made some tests on Vinsol resin cements in order to evaluate adequately the properties of the material, which has come into wide use because of its airentraining properties. The results of the tests as reported herewith were recently published in the bureau's *Technical News Bulletin* of Oct., 1944.

When a small percentage of air is incorporated in the concrete, pavements have been found to be more resistant to scaling and to destruction by cycles of freezing and thawing or by action of salt solutions. The commercial production of air-entraining portland cement by intergrinding of small quantities of Vinsol resin in the manufacturing process is a rather recent development. The properties of some of these Vinsol resin cements, however, were such that it was impossible to test them according to the existing specifications. New tests were required as well as the development of new testing techniques.

The bureau recently procured 64 commercially manufactured Vinsol resin cements in order to study the water requirements of the pastes and mortars, to determine the quantities of air entrained in the various pastes and mortars in concrete and also to make a survey of strengths of the test specimens.

The neat pastes of Vinsol resin cements were stickier than the neat pastes of the untreated cements and also had a tendency to stiffen more rapidly. The cement-sand mortars made of Vinsol resin cements and proportioned according to present federal specifications were in most cases more plastic than the mortars of the untreated cements. Whereas the neat pastes of Vinsol resin cements required as much or more water than the neat pastes of the untreated cements, the cement-sand mortars usually required less water for the same workability.

Concretes made from the different cements entrained quantities of air ranging from 1 to 14 percent. The air contents of the pastes, of the 1 to 3 mortars, and of the 1 to 2.75 mortars were not indicative of the air entrained in concrete. Of the various mortars and pastes tested, the 1 to 4 mortar, which has been proposed as a performance test, had the greatest range of air contents with the different cements.

Most of the Vinsol resin cement mortars had both tensile and compressive strengths greatly in excess of specification requirements. A few of the cements, however, failed to meet the 7- and 28-day compressive strength requirements. The cements had a wide range of strengths at 3 days; for example, tensile strengths were obtained for the different cements ranging from 195 to 465 psi. and compressive strengths ranging from 900 to 3,360 psi.

Increased Highway Traffic

Intercity passenger travel in the first postwar year will be about 5 percent greater than such travel in 1941, according to a study of the Bureau of Transport Economics of the Interstate Commerce Commission. About 87 percent of this travel would be by private automobile. Such a projected increase in automobile traffic would be an advance of 38 percent over the average year during 1935-39 and 6 percent in excess of such travel in 1941. The increase in intercity automobile travel from 1931 to 1941 was about 60 percent.

Fig. 1. Side walls and the ties between them were in place before the filling began.

A 2,400-Ft. Pier Built From Scrap

N. A. Bowers
Pacific Coast Editor, Engineering News-Record

***Contents in Brief**—At Tarawa, Seabee ingenuity made possible a pier 34 ft. wide and 2,400 ft. long for which the metal was salvaged from wrecked stockpiles of Jap rails, reinforcing rods and corrugated iron plus our own Marston mat.*

THE GREAT WIDTH of shallow water adjacent to the high tide line at Tarawa in the Gilbert Islands was an important factor in the battle that cost the lives of nearly a thousand U.S. Marines. These shallows also presented a problem to construction men who closely followed the combat troops. The urgent and immediate need when the Seabees came ashore was for some sort of a pier or causeway on which trucks could move out to a point where water depth at all tide stages would be enough for speedy unloading operations. As this distance was some 2,400 ft., exposed to wave action for the full length, an ordinary fill was impracticable in the absence of rock or other material for protecting it against the waves. Width for three lanes of traffic was required at this location.

Construction materials had not been brought in for any such structure and the coconut trees on the island were too soft to make good piles. However, the Japs had been carrying on construction work on this island for a long time and had in storage there considerable quantities of reinforcing bars, T-rails, steel cable and corrugated sheet iron.

Material from Jap stockpile

From stock piles of Jap materials, some of which sustained heavy damage in the bombardment, ingenious Seabees selected whatever could be used in the pier. A great deal of 20- and 40-lb. T-rail, in 19- and 30-ft. lengths, respectively, was used as was also the corrugated iron. Some of the latter, bent in the bombardment, had to be laid on the ground and rolled flat with the roller used in surfacing the airstrip. These materials, with a large quantity of steel reinforcing bars brought in by the Nips, were ingeniously put together into the supporting structure for a coral fill that has served remarkably well as the pier.

For construction operations, a pile driver was rigged up with leads suspended from the end of a crawler crane boom. The driver put down the 19-ft. lengths of rail as piles, spaced 3 ft. 4 in. on centers and arranged in a double row 34 ft. apart. Since there was not enough 40-lb. rail for the ex-

re job, these heavier sections were ed for every third pile or on 10-ft. nters. When no more 40s were ailable, three of the 20s were used a cluster made by driving the three les separately.

The tide at Tarawa has a range of out 7 ft. and thus by driving the ils so that a 10-ft. length would be ft projecting, a minimum of about ft. was always above high tide. This s considered sufficient freeboard, r emergency construction, to pro- t the fill from storm waves.

A lining inside the rails was made Marston mat, laid up on edge, with pped joints. This mat provided a niformly stiff side wall, it could be sily spot welded to the steel rail nd it then required only some sort lining to prevent the fill material hich would be largely small, loose oral particles, from going through e holes. This was accomplished by e use of corrugated iron and what- er other flat material was handy. alvaged cable or reinforcing rod, s was available, was then put in as transverse ties, being run through holes in the sides and welded to the ails. These ties extended across the ier at three levels: Near the top, bout midway of the exposed pile ength, and just above the mud line.

Coral used for fill

After the side walls were in place filling was started with a dragline which scooped up loose coral, the only material available, working out from the shore end along the side of the pier selected for a channel. When the dragline had thus reached a point where water depth permitted, it was placed on a barge and work continued as before. The only "deck structure" put on the fill was a string of cocoanut logs laid along each edge as curbs. These logs were secured to the projecting tops of the steel rails.

At its outer end the pier terminated in a concrete facing on sides and end, with hinges embedded in the outer face for later attachment of a string of pontoon cell barges that could serve as a floating extension of the pier. No such extension was added, however, as it was later decided to substitute a large coral fill (some 200x350 ft. in surface area) at the end of the pier on the side away from the channel. This fill provided a beach on which LSTs could nose in for unloading and afforded parking and turning area for the trucks.

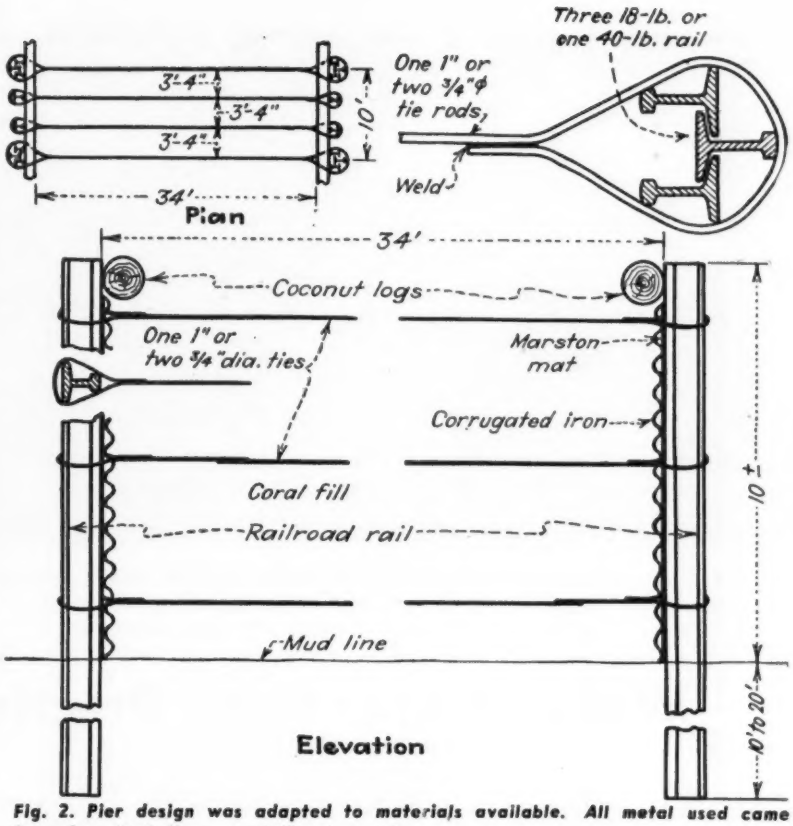


Fig. 2. Pier design was adapted to materials available. All metal used came from Jap stockpiles except Marston mat.

Decision concerning the type of construction was made by Capt. H. W. Johnson, CEC, USNR, who served as supervisory engineer on many emergency jobs in the Gilbert and Marshall Islands. The Tarawa pier was built under the personal direction of Comdr. F. G. Elliot, CEC, USNR, St. Louis, Mo.

Fig. 3. Inside the side walls before filling. Note that at 10-ft. intervals piles project above lining to hold the cocoanut log curbing.

Fig. 1. All types, sizes and makes of water meters are economically repaired in Chicago's water meter repair shops.

Water Meter Shop Practice in Chicago

***Contents in Brief**—Short-cuts and improved methods of water meter repair developed by Chicago over the past thirty years are paying dividends now. Consequently, wartime shortages of replacement parts has not handicapped repair operations. The following article describes what is done and how.*

SHORTAGES of both manpower and critical materials caused by the war have made it necessary for industry to effect many salvage and reconditioning processes. Some plants, however, have not been able to do this job satisfactorily and hence have to wade through the delays of red tape, priorities and uncertain deliveries. Such inconvenience has been eliminated to a large extent from the water meter shops of the City of Chicago, because for the past thirty years every practical means of reconditioning meters and meter parts has been practiced. The methods employed to eliminate, so far as possible, the use of critical materials and conserve manpower are described herewith. Disc meters only are discussed since they form the largest percentage of meters in use at the present time.

Chicago's water services are about 27 percent metered. Meters range in size from $\frac{5}{8}$ to 12 in. and are maintained by the Water Meter Division, Department of Public Works. The work requires a field force of nine trucks operating continuously with crews of three men each. A crew of 45 machinists work full time in the shop.

There are several conditions under which a meter can find its way into the shop for repairs. First the records may show it has been in service beyond certain specified limits, using the following criteria:

Size	Volume Limit
$\frac{5}{8}$-in.	150,000 cu. ft.
$\frac{3}{4}$-in.	350,000 cu. ft.
1-in.	600,000 cu. ft.
1¼-in.	1,000,000 cu. ft.
1½-in.	1,400,000 cu. ft.
2-in.	2,500,000 cu. ft.

These limits apply to most of the meters. For the type considered best, however, the limit is raised about 42 percent.

Again, meters may be brought in because of a complaint. Registering "too high," "not registering," and "low pressure" are ordinary complaints.

Upon arrival at the shop the meter is inspected and cleaned. Then all necessary repair work is done and the meter is reassembled and tested. It is tested with the same gears it ha when it arrived, and according to th American Water Works Associatio specifications. If operational acc racy is not within the limits prescribe therein, the gears are changed an retests are made until A.W.W.A specifications are satisfied.

Cleaned with acid

All non-ferrous parts of the mete except the disc, are cleaned in an aci bath. The process consists of passin the various pieces through solution in five separate containers. The firs solution contains 1 lb. of caustic po ash to 1 gal. of boiling water; th second, 3 parts nitric acid and 1 par water; the third, 1 part sulphuri acid, 1 part nitric acid and 1 par water. Eight ounces of rock salt ar added for each 9 gal. of this latte mixture. The fourth solution is cold water rinse and the fifth a ho water rinse. The first dip may b eliminated except for very dir meters. Passing through the remain ing four steps (Fig. 4) takes abou 30 sec., with no more than 3 or 4 sec spent in the acid baths.

One source of constant trouble which is being eliminated, is that o warped discs caused by hot water o steam backing up from the hous toward the main. When this occurs

the rubber disc generally becomes semi-plastic, expands, binds on the wall of the measuring chamber and ultimately is "warped" out of shape (Fig. 2-D). Many shops discard a warped disc and install a new one in the meter. This is an expensive practice, however, so about thirty years ago Chicago started salvaging and reconditioning discs so damaged.

The proper way to prevent discs from becoming warped by hot water and steam is to install a temperature control and pressure relief valve, which must be placed on top of the hot water tank or unit, or in the hot water line not more than 3 in. from the tank or unit. A Chicago city ordinance makes this mandatory. At the present time, whenever a meter is brought into the shop and the disc is warped, a notice is sent immediately to the owner of the premises to install the relief valve. Failure of the owner to comply within a specified time results in the water being shut off until the installation has been made. An inspection follows to see that the work has been done properly.

Records show that no second occurrence of warped disc has ever been found after the installation of the relief valve.

Warped discs usually are discovered when a consumer complains that his meter is out of order. A crew is dispatched to the location of the complaint and an attempt is made to repair the meter on the job. When a disc is found to be out of alignment a new meter is installed and the damaged one brought into the shop. Here it is taken apart and unless the disc is beyond repair, the salvage starts.

First the discs are taken apart, the half-balls removed, and the spindles that can be used again are saved. The disc itself is immersed in boiling water for about 15 min. or until the repairman can bend it slightly between his fingers. Next it is inserted in a hand operated press, as shown in Fig. 3. Flat discs are placed directly on the bottom of the press but conical discs are placed in molds of proper size, made by the shop's machinists. Pressure is then applied (directly to the flat discs, and to the top of the mold for conical discs) and the discs brought back to their proper shape. A few minutes in the press does the job. Occasionally it is necessary to press a disc twice but once is enough for practically all discs being flattened or re-cupped.

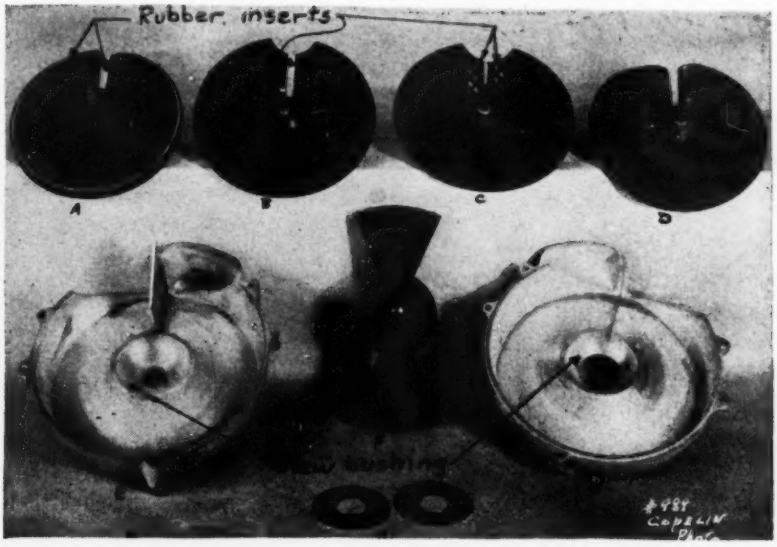


Fig. 2. Noisy meters are silenced by keying gum rubber inserts into flat meter discs (A) and conical discs (B) and (C). Typical deformed half-ball is shown in old warped disc (D). Both the lower half (E) and the upper half (G) of a repaired meter chamber are fitted with new bushings, finished to fit a master disc (F). Brass shims (H) are inserted between the two half-balls when needed.

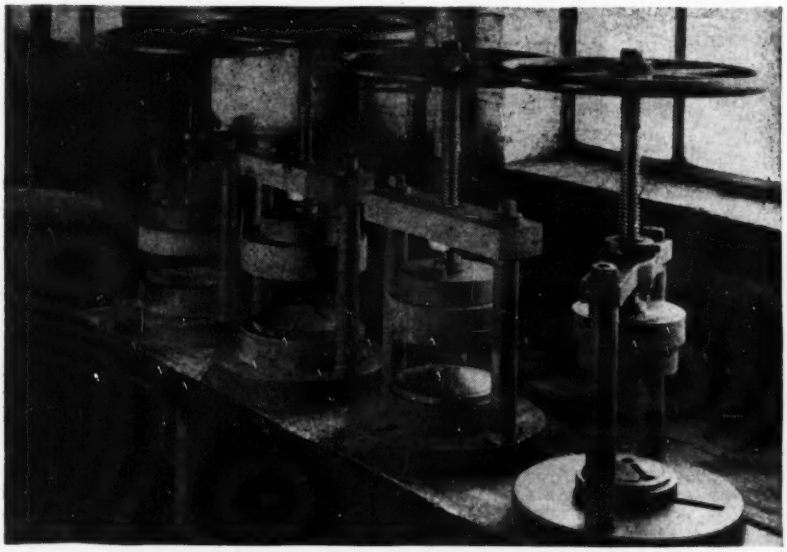


Fig. 3. Warped discs are straightened in hand presses, after being heated in a hot water bath.

Flat discs of the same size are then mounted on a mandrel and turned to proper diameter. Conical ones conform to the mold and usually come out perfect.

While this process has been going on the half balls are being inspected elsewhere. Where they are still the proper size, they are used immediately. Where they are out of shape or worn excessively, they are turned down to the next smallest size and sent to the stock room for future use. All tools required for this process were designed and made by Harry Richards, foreman of the shop.

Repairing gear trains

Gear trains are inspected and repaired, the worn parts being replaced by new ones obtained from the manufacturer. Special fixtures and jigs have been made that permit the rehabilitation of many trains that formerly were discarded. This repre-

Fig. 4. Old meters are cleaned in 30 sec. by passing them through two acid baths followed by two water rinses. A third acid bath is used for exceptionally dirty meters that sometimes reach the repair shop.

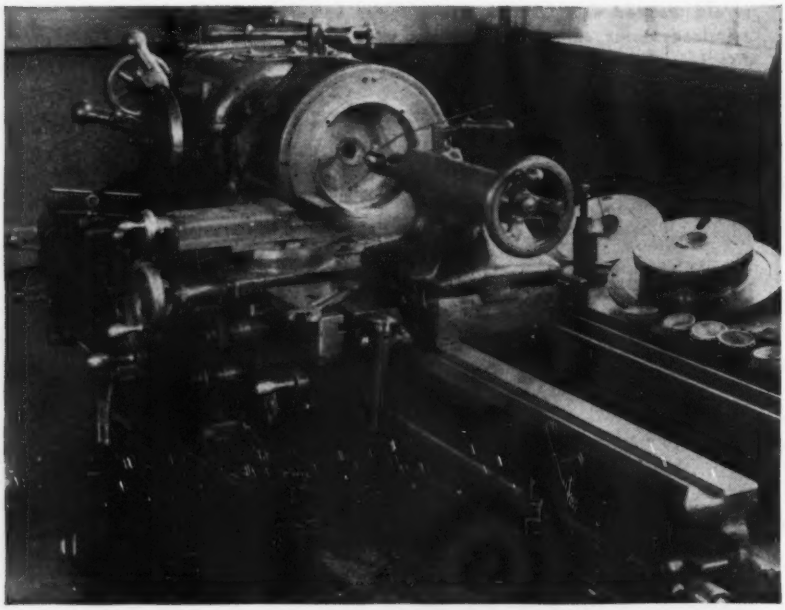


Fig. 5. Lathes equipped with special holding fixtures turn the ball socket of previously bushed measuring chambers to the correct finished size.

sents a considerable saving and in many cases improvements have been made in the wearing qualities of the original train.

The special jigs permit the straightening of trains that come from frozen meters and are in badly distorted condition. Where the gear train frame was not rubber bushed for the rolled phosphor-bronze spindles, the jigs make it possible to drill the frame for rubber bushing with the correct sized hole for the gear spindle. In this manner a train is produced, which is as good as new, at a fraction of the cost of a new one.

Disc chambers are bushed

In disc meters the tendency of the disc is to wear to the outlet side of the measuring chamber. Such action causes the ball sockets to wear over to the outlet side in addition to wearing deep, especially in the lower half of the chamber.

To overcome this condition it was formerly the practice to re-machine the entire chamber to fit a standard disc, which resulted in its becoming lighter with each successive machining. Eventually it became necessary to discard it and replace it with a new chamber.

In 1916 a new method was adopted whereby each disc chamber retains its original weight indefinitely. This method consists of bushing the upper and lower ball sockets of each measuring chamber. Material used for bushing is as good or better than the original material of which the measuring chamber was made. It is composed of 86 percent copper, 7 per cent tin, 5 percent lead, and 2 per cent zinc. A gate pattern was made for the different sizes required to bush measuring chambers from ¾ to 2 in. By combining the patterns for the upper and lower sockets on one gate, according to make and size, 40 different meters, ranging in sizes from ¾ to 2 in. inclusive, can be bushed.

To install the bushings, the old sockets are bored out with a radius tool to a size approximately ¼ in. larger than the standard disc required for the chamber being bushed. Judgment determines the depth to sink the bushing as it is an easy matter to face off the upper edge that projects above the surface of the socket.

The next step is to solder the bushings into the chamber. The bushings, being made from a metal pattern with a recess in the upper edge to provide chucking them on a three-jawed chuck, are easily filed to fit the old socket that previously has been bored out. They are now ready to be soldered in place in the measuring chamber. A special iron gas table was constructed and equipped with six Bunsen burners for heating the parts. The bushing is soldered in the top and bottom sockets of the measuring chamber and ready to be turned to fit the ball on the disc.

The lathes used for this purpose are equipped with special fixtures (made in the shops) that are screwed on to the lathe spindle in the same manner as a chuck (Fig. 5). These fixtures are equipped with plates having a check to fit the checks on both the upper and lower halves of the measuring chamber, and by the turn of a wheel on a shaft extending through the hollow lathe spindle, a plate is pressed against the half chamber to hold it firmly in place in the fixture. Here the ball socket is turned to finished size.

By following this procedure the resulting chamber is as true as the day

left the factory and with no loss of original weight. Disc balls also are sized on the repaired discs of $\frac{1}{32}$ to $\frac{1}{8}$ in. above and below standard sizes. This enables the original ball socket to be trued to an oversized ball and also, after reaching the oversize limit, and needing a bushing, to turn the bushing to an undersized ball. In this manner the ball size can be changed several times before the bushing is worn out and has to be replaced with another.

In using undersized balls on the disc, it is necessary either to draw out the division plate or to solder on a piece to make the proper fit between the division plate and the disc ball. Pieces, for soldering on, are obtained by cutting rings from a piece of brass tubing, cutting them to the proper width and then cutting the rings into segments of the proper length and soldering them to the arc of the division plate. Of course, if the division plates for the 1½-in. and 2-in. sizes are made in the shop they can be sized for the undersized ball, and as the bushings are bored out for the oversized balls the arc of the division plate can be filed out to fit as long as it is usable.

The above outline is not followed in repairing ⅝-in. meters. It is more economical not to bush them but to oversize the balls from $\frac{1}{32}$ to $\frac{1}{8}$ in. This prolongs the life of the meter, but it may be necessary to change the ball size several times during its life.

Liners for disc balls

Liners for disc balls are made from 0.018-in. thick sheet brass, and the following widths are used for the discs indicated:

⅝-in. Federal ⅝-in. Gamon	0.018x1¼ in.
1-in. Federal 1-in. Lambert	0.018x1½ in.
¾-in. Wor. Disc. 1-in. Gamon	0.018x1$\frac{13}{16}$ in.
1-in. Wor. Disc.	0.018x1$\frac{15}{16}$ in.
1-in. Arctic 1½-in. Badger 1½-in. Gamon 2-in. AX Nash	0.018x2$\frac{1}{16}$ in.
2-in. Gamon 2-in. Lambert 2-in. Trident 1½-in. Wor. Disc.	0.018x2$\frac{5}{16}$ in.
2-in. Wor. Disc	0.018x3$\frac{1}{16}$ in.

Punches and dies were made to punch out the correct outside diameter and hole to fit the boss on the balls to be used.

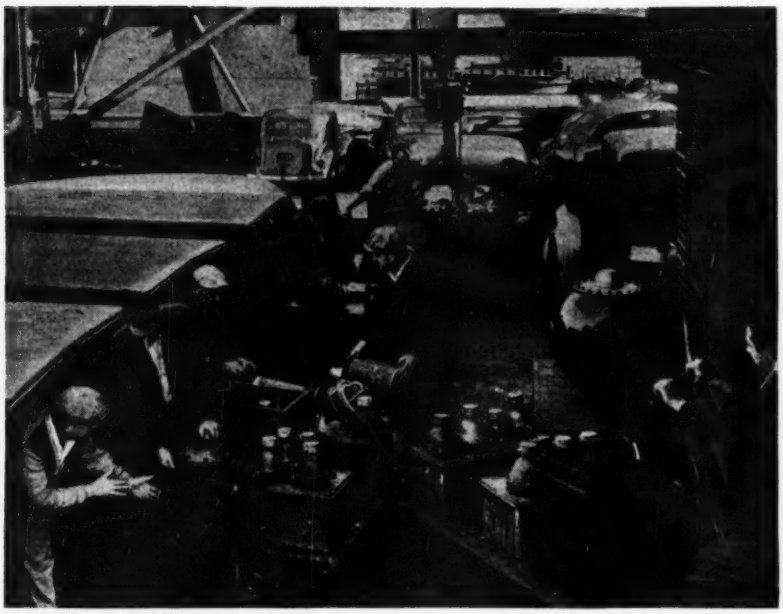


Fig. 6. Reconditioned water meters are transported on skid-trucks to waiting repair trucks for reinstallation. Chain hoist at far end of platform handles large meters and fish traps.

When turning the balls with the ball-turning tool, a liner (Fig. 2-H) is placed between the face of the ball and the chuck holding it, and the number of liners used is marked on the ball with a crayon, so that when the discs are assembled the proper number of liners is placed under each half-ball, not to exceed two. These are fitted to a master disc chamber, which is used for assembling all reclaimed discs.

Some spindles are reused

Disc spindles are sorted when the discs are taken apart and those not too badly worn are reused; the others are scrapped and replaced by new spindles. In some makes of meters it is possible to re-machine the part that comes in contact with the control roller and use them on smaller sizes. In other cases it is possible to cut off the upper part of the spindle and replace it by inserting a piece of red phosphor bronze of the proper diameter, which makes the spindle as good as new for wearing qualities.

In discs having thrust rollers, the problem of wear in the thrust roller hole has been overcome by buying thrust rollers with an over-sized spindle in sizes up to 1 in. In the 1½-in. sizes, the disc has been saved by inserting a piece of rubber into the disc, pinning it into position and re-drilling for a standard thrust roller. The rubber used for the inserts is obtained from old broken discs of the same make and size. It is ideal for this purpose.

Silencing noisy meters

Complaints of noisy meters, while not too frequent, cause many headaches among meter repairmen. On meters equipped with thrust rollers, a measure of relief has been effected by the insertion of a metal slot in the roller groove. However, there still remain the disc noises, which are quite loud in many cases, especially where there is no thrust roller.

New conical discs are usually quiet but as the disc balls and sockets become worn, heavy pounding develops due to the edge of the disc slot striking the diaphragm or division plate at the outlet port of the measuring chamber. In the case of a flat disc, this noise is augmented by the disc itself striking against the top and bottom chamber plates.

Such noises are a matter of small concern in factories and in homes where all use of water ends when the family retires for the night. But in large apartments supplied by 1½-in. and 2-in. meters, and where water

may be used any hour of the night or day, a noisy meter deprives families of their sleep and becomes a major nuisance. Furthermore, changing the meter is no cure as the replacement soon becomes noisy.

To quiet the conical discs, a piece of gum rubber $\frac{1}{8}$-in. thick is inserted in a slot cut into that edge of the disc that strikes against the diaphragm on the outlet port of the measuring chamber. This strip of gum rubber is kept secure by small pins that hold it in the disc (Fig. 2-B, 2-C).

Additional work on flat discs

In the case of flat discs, in addition to the above treatment, it is necessary to cut a slot in the top and bottom of the disc. This slot is $\frac{1}{16}$-in. deep and extends completely around the disc (Fig. 2-A) about $\frac{1}{4}$-in. from the edge. A strip of gum rubber $\frac{3}{16}$-in. thick is forced into the slot and is kept from working out by pinning the ends through the body of the disc and by the insertion of a few small pins through the strip around the periphery of the disc.

The cost of eliminating all disc noises has been $1.98 each for conical discs and $2.76 each for flat discs used in the 1½-in. and 2-in. meters.

A considerable number of fully repaired meters so equipped have been installed in buildings where the consumers were continually complaining about noisy meters. In each case, there has been no further complaint and on subsequent visits representatives of the water meter division have been told that the "present meter is the best one we ever had."

By eliminating the expense of field men removing noisy meters a saving many times in excess of the cost of quieting the meters has been effected, and the goodwill that has been achieved by the removal of a repeating nuisance is something that cannot be measured in dollars and cents. Mark Sheridan, general foreman, conceived the idea of quieting meters and his extensive research on the problem yielded the solution described abo

There are about 115,000 meters service in Chicago at the present tim Some 43,000 of these are 1 in.; 1 000 are 1½ in. to 12 in.; and t remainder ⅝ and ¾ in. Over 15,0 meters were repaired in the shop d ing 1943, requiring a total of m than 48,000 separate jobs to be do

Total registration during 19 amounted to over 22,500,000,000 ft., or about 196,000 cu. ft. per met The shop cost per 1,000 cu. ft. metered water was $0.0095.

Operating personnel

The meter shops are a division the Bureau of Engineering, Chica Department of Public Works, and under the direction of W. W. B Berard, city engineer, reporting Oscar E. Hewitt, commissioner public works. Those in direct char of the work include Mark I. Sherida John Golden and Harry Richar Their years of effort are paying City of Chicago dividends.

Comments on Water Meter Repairs As Practiced in Seven Large Cities

***Editor's Note**—The repair of water meters plays an important role in the economics of municipal water distribution. How meter repair practices in seven other large cities compare with those used in Chicago is told in the following comments made in response to advance proofs of the foregoing article.*

San Francisco Practice

In the following notes I have covered only those points in our meter repair practice which are slightly different from methods employed by Chicago. No attempt has been made to cover what I believe is common ground.

Our water department owns and maintains 135,000 meters. Of these, 125,000 are of the ⅝-in. size; there are 2,500 each of 1-in. and 1½-in.; and 3,000 of the 2-in. size. The largest is a 12-in. meter. Our meters are set and changed by servicemen who also make repairs in the field such as replacing broken glasses, lids and dials and repacking spindles. Occasionally our shop men repair the larger meters in the field rather than bring them into the shop. Meter batteries are set on almost all services larger than 3 in. We do not change meters after any specified amounts of water have passed through them, since present conditions do not warrant such a plan.

Meters brought into the shop for repairs are first cleaned by washing and brushing. Outside casings then are dipped in normal strength commercial muriatic acid, followed by further washing. Gear trains, chambers and dials are soaked in a solution of one part sulphuric acid to five parts water for 20 to 30 min. Then they are dipped for a few seconds in a solution of two parts sulphuric acid and one part nitric acid, followed by final washing in cold water. This process of cleaning meters has been used by our department for the past 35 years.

Flat discs are heated in hot water and straightened between flat plates in a vise. We have few conical discs and they are not repaired. The bal are raised by paper shims and t ball sockets are reground to fit. T shop work is performed by one fo man and two men.—GEORGE W PRACY, *Superintendent, Water D partment.*

How St. Louis Does It

For a number of years we have r moved all water meters 4 in. an smaller after five years of servi and brought them into the shop fo inspection, cleaning and repairin where necessary. We contemplate in creasing this length of service b tween inspections to eight years, ho ever, unless the meter in question ha a very large registration.

In St. Louis, we do not straighte warped discs damaged by hot wate but train gears are rebushed and re paired. When meters are damage by hot water, the consumer is bille for the cost of testing and repai He also is required to install a pre sure relief valve and check. Cost repairs due to freezing, howeve is assumed by the city since th meters are city owned and were in stalled under city supervision.

During 1943 our average cost fo installing, removing and repairin meters of all sizes was $15.80. Fo

the smaller meters, 78.5 percent of which are 1-in. and under, the average costs of repair are: $2.08 for the ⅝-in. meters, $2.43 for the ¾-in. size and $2.87 for the 1-in. meters.—THOMAS J. SKINNER, *Director of Public Utilities.*

Methods Used At Buffalo

Since we have only 17,000 meters in service it would hardly pay us to go to the expense of installing jigs, lathes and presses to recondition the relatively few parts which now are scrapped. We maintain a meter repair service but do not recondition worn out or warped discs, spindles and gears. Such defective parts are scrapped and new ones installed.

We carry in stock all parts necessary to repair meters up to 2 in. and do that work with one tester, two repairmen and one laborer. Meters up to 2 in. are furnished by the city and remain its property. Any cost of repairs due to the consumer's neglect is charged to him.

Meters over 2 in. are purchased by the consumer and remain his property. Defects developing in these meters are repaired by the manufacturer on direct order of the consumer. We usually are in a position to lend a meter until the condition is remedied, and a stock of various sized meters is kept on hand for that purpose.—ALAN D. DRAKE, *Director of Water, Department of Public Works.*

Milwaukee Repair Methods

Milwaukee's water services are 100 percent metered. The 98,950 meters now in service, ranging in size from ⅝ to 16 in., are owned by the consumer but maintained by the city except for those damaged by frost, heat, hot water, steam or negligence. Charges for these special repairs are chargeable to the consumer.

Meters find their way into our repair shop under conditions similar to those in Chicago. A bypass connection is installed in the line before removing the meter and the consumer is billed on the average previous consumption while the meter is being repaired.

Upon arrival in the shop, the meter is tested on the full flow and down to as low as it will register. Failing to meet A.W.W.A. specifications, the meter is disassembled, thoroughly washed in hot water and de-alkalized by treatment with "No. 32 Oakite Compound" to remove all foreign substances. The parts then are carefully inspected, good parts are salvaged and the others are reconditioned or replaced. If the cost of reconditioning a meter is prohibitive, it is condemned and its replacement is charged to the consumer.

For badly worn chambers, we use a new three-part disc, placing shims under the top and bottom balls and grinding the disc in the chamber with emery to a perfect fit. If gear trains are worn completely, they are replaced with new trains, but all reclaimable parts are saved. Hard rubber bushings are installed in all gear trains wherever possible, and salvaged spur gears are used when available.

The stuffing box bearing and upper driving pawl are always examined carefully for wear, and are entirely replaced if necessary. The register dial also is examined to see that all pinions are free of defects. All parts of the meter then are thoroughly washed in hot water and the meter is reassembled and tested.

For the past two years we have been replacing warped rubber discs, which are discarded, with a "no-warp" disc. Attempts have been made to rebuild measuring chambers by the application of "Tobin" bronze and remachining them. This practice, however, was discontinued for all except the larger meters due to its excessive cost.

Noisy meters are brought into the shop and tested on various flows. If noise is detected a new disc is installed and, if need be, a new chamber. The following gives an over-all picture of meter repair service during 1944:

Of the 555 large meters (3 to 16 in.) tested on the premises, 116 tested incorrect and 439 were found to be metering water within the allowable limits of plus or minus 1.5 percent. Total under-registration was found to be 11.12 percent, total over-registration was 3.48 percent and the average under-registration per meter was 1.37 percent.

During 1944 the city received $3,257,100 for its metered water. Total pumpage for the year was 38.039 mg. of which 83.79 percent (31.663 mg.) was recorded on the meters, plus 2.52 percent meter slippage. Seven trucks operate continuously in collecting, testing and reinstalling meters, and the meter repair and service department personnel numbers 29 employees.—OTTO W. DUMMER, *Superintendent, Division of Meters and Services.*

Repairs at New Orleans

In repairing our water meters we do not bush any disc chambers but do repair and rubber-bush damaged gear trains on jigs designed to fit all makes of trains. Discs warped by hot water are not remolded but the spindles are removed from such discs and reused when in good condition. Check valves are required to be installed where meters are damaged by hot water. We have no particular trouble with noisy discs.

During 1944 we repaired 7,380 meters and, to date, have tested 95,710 new meters as shown in the following table:

Size of Meter	*No. Meters Tested*	*Size of Meter*	*No. Meters Tested*
⅝-in.	84,230	4-in.	650
¾-in.	5,460	6-in.	320
1-in.	3,120	8-in.	36
1½-in.	1,150	10-in.	6
2-in.	690	12-in.	27
3-in.	20	16-in.	1

Note that extremely few of the meters tested have been in the large sizes.—A. B. WOOD, *General Superintendent, Sewerage and Water Board.*

Denver Has Few Meters

We have read the Chicago water meter repair article with considerable interest and find that it parallels our practice in several respects. We do not, however, attempt to recondition warped discs, manufacture meter parts or make over damaged parts to fit other or smaller meters. Less than three percent of our services are metered, using a total of 3,300 meters varying from ⅝ to 12 in. in size.—D. D. GROSS, *Chief Engineer, Board of Water Commissioners.*

Los Angeles Repair System

The approach to water meter repairing in Chicago is somewhat different from that employed in our department. This may in part be occasioned by the fact that physical and climatic conditions affecting water meters in the Chicago system are quite different from those experienced in Los Angeles.

Our system is 100 percent metered,

with 320,366 meters in service on April 1, 1945. During the preceding year our meter shops repaired 11,500 units, and in addition tested more than 22,000 new and repaired meters.

Recent tests and inspection of over 4,500 operative small domestic water meters taken from our system with continuous periods of service ranging from 1 to 35 years without repairs or testing, show that the general average of registration accuracy was 100.4 percent on the high flow and 99.1 percent on the low flow of 1¼ gpm. From this record of actual field operation of our meters, we feel that it is not necessary to remove for tests and inspection those which are in operation in our system for periods of less than 20 years. Control for the continued efficient operation of our meters in service, however, is accomplished by close checking of monthly readings followed, where sudden changes in consumption occur, by field inspection and tests on the meters involved. This saves unnecessary handling and processing of those that do not need inspection and repairs.

Unlike Chicago's employment of machinists for meter repairing, we employ repairmen for general meter repairing and one machinist to fabricate and recondition certain parts. Generally we replace with new any parts that need extensive machining or refabrication, as we have found this replacement less expensive in cost. Personnel for both repairing and testing in our two shops number 19, including the shop foremen.

Meters brought in for repair are cleaned on the outside by a power driven wire brush or sandblasting operation. The internal machined parts are cleaned with a scrubbing brush and water. For severe cases of corrosion deposits, a hand scraper may be used.

Reconditioning of burned or sprung water meter discs is accomplished by a somewhat different process from that used by Chicago in that our discs are remolded in a precision die, which definitely controls the size and shape of the disc and precludes the necessity of machining its periphery to the correct diameter. We have also found that the use of mandrel pins in our remolding process is quite effective in forming a perfect thrust-roller hole in the periphery of the disc for insertion of the thrust-roller and eliminates the necessity of inserting a rubber or metal bushing where the thrust-roller hole is worn oversize. Discs remolded in our shop have been used in place of new discs without loss in efficiency. In addition, this method of remolding burned or sprung discs permits reclaiming 50 to 60 discs per 8-hr. operation.

Worn disc balls are ground to a perfect fit in the measuring chamber by the use of a water-solvent grinding compound after the half-balls of the disc have been properly shimmed to increase their diameter. We have found this method inexpensive and effective, and it has increased our registration accuracy from two to four percent, depending on the size and make of the meter involved.

All gear-train repairing is done by a meter repairman, specially trained for the work. Similarly, we have a specialist on repairing our registers so that the individual repairman need not disassemble, clean, rebrush or replace parts in gear trains or registers.—LAURANCE E. GOIT, *Assistant Chief Engineer of Waterworks, Department of Water and Power.*

Outstanding State Obligations For Highways Total $1,618,049,000

State highway obligations outstanding December 31, 1943, totaled $1,618,049,000, according to figures recently released by the Public Roads Administration. The purposes for which these obligations were incurred include:

State highways	$975,213,000
Special state issues for bridges and grade crossings	152,090,000
Special construction issues, state highway share	42,970,000
State issues for toll roads and bridges	156,247,000
State issues for reimbursement	98,425,000
Reimbursement obligations assumed	182,512,000
State issues for county or local roads and bridges	10,592,000
	$1,618,049,000

Against the above obligations there was held in sinking fund reserves on December 31, 1943, the sum of $208,903,437.

Bonds of interstate toll authorities and others primarily of urban or local character are not included. Among those not included are: Port of New York Authority (New York and New Jersey), $181,046,000; Delaware River Joint Commission (Pennsylvania and New Jersey), $37,000,000; Lake Champlain Bridge Commission (New York and Vermont), $1,219,000; Golden Gate Bridge District (California), $34,600,000.

PRA reports that during the calendar year, 1943, additional bonds amounting to $30,721,750 were assumed by states as follows:

Ala.	$4,178,000	N. Y.	$12,000,000
Fla.	2,446,250	S. C.	150,000
Iowa	2,750,000	Tenn.	4,797,500
La.	1,100,000	W. Va.	3,000,000
N. H.	300,000		

Disbursements on account of debt service in 1943 aggregated $180,907,265, of which $122,007,813 represented retirement of principal, the balance covering interest, administration and premiums on called bonds.

Current receipts during 1943 applicable to debt service amounted to $175,943,758, of which $142,902,35 was provided by highway user taxes $12,080,250 by highway user tolls $4,777,202 paid from sinking funds largely contributed in earlier years b highway users, and $12,146,236 de rived from proceeds of refunding is sues. Other miscellaneous receipts including general property taxes, pro vided $4,037,716.

Inter-American Projects Revealed by Survey

A survey just completed by the Health and Sanitation Division of the Institute of Inter-American Affairs reveals a total of 821 projects in 1 American countries, under the Inter American Cooperative Program. The Institute announces that 470 of these projects are started or in work and the rest have been completed. Of those in work, 330 involve medica care. Building and construction proj ects, including hospitals and dis pensaries, total 195, either complete or under way. The Institute als states there are 296 sanitary projects

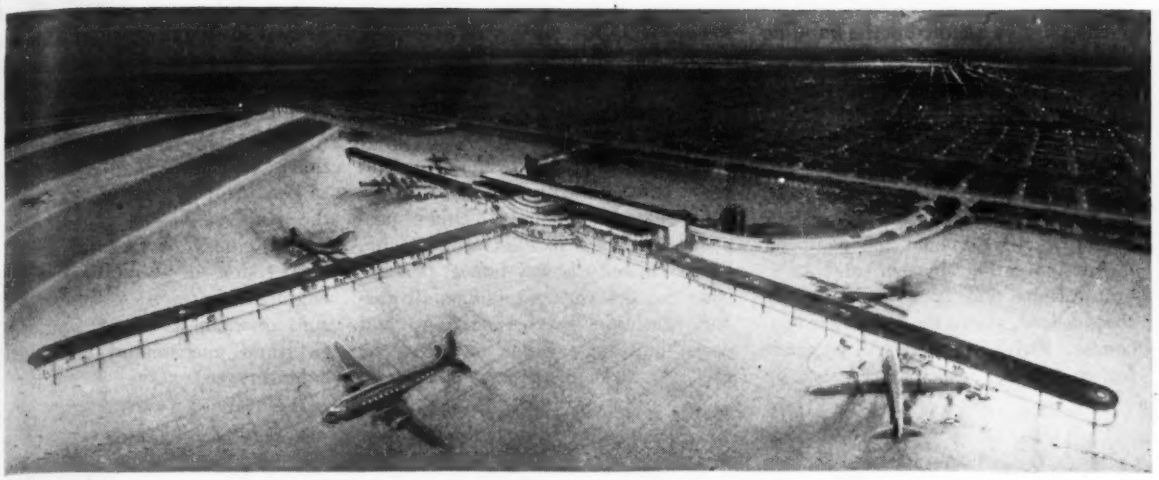


Fig. 1. Covered passageways will lead from a modern terminal building to 25 loading stations at Detroit's new airport.

Metropolitan Detroit Plans New Airport

CONDEMNATION PROCEEDINGS are under way to secure one square mile of land selected as the site for a new airport at Detroit, Mich. Located within 30 minutes driving time from the downtown business district, the new site will be bounded by Eight Mile Road, Dequindre, Nine Mile Road and Ryan Road. Detail plans have not yet been started, but preliminary plans encompass ultimate requirements. They also provide for step-by-step development from initial primary necessities to final completion, in accordance with the growing needs of a major air terminal.

Plans provide for dual runways in three directions, but single runways only may be built at first. The largest runway proposed is 200 ft. wide and 6,700 ft. long. Others, all 150 ft. wide, are one 6,200 ft. long, two at 5,400 ft. and two 4,800 ft. in length.

Modern terminal building

The terminal building, facing on Eight Mile Road, will be of latest design, providing for the centralized handling of incoming and outgoing passengers, baggage, express and mail. Passengers will enter the second floor of the building via a ramped roadway, while other services will be accomodated at the lower, or field level, floor. Ticket offices will be provided for ten airlines and the passenger concourse will seat 500 people.

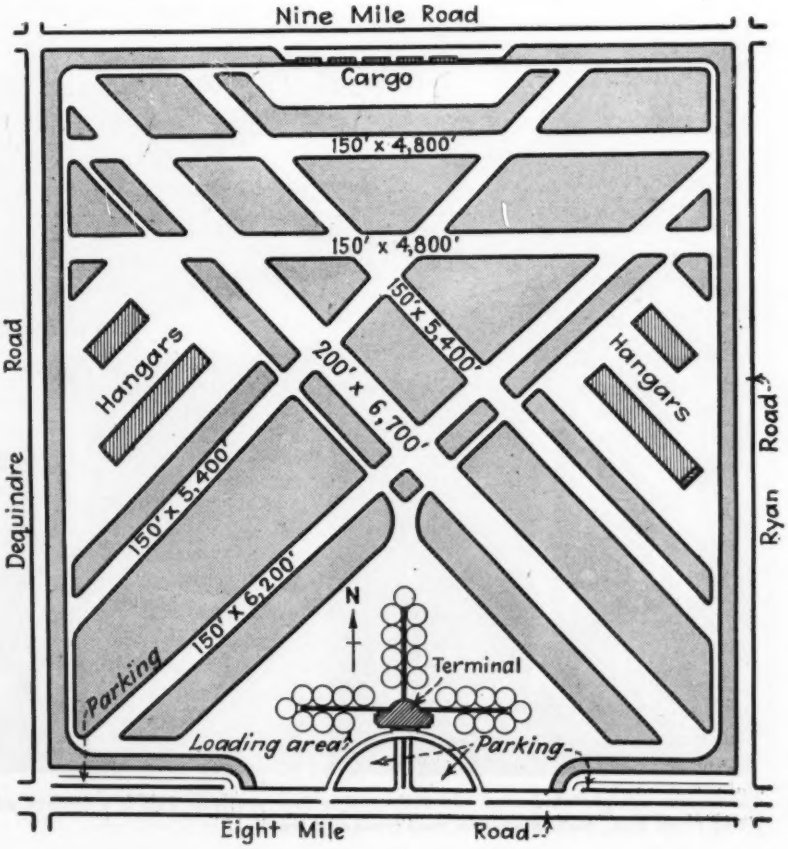


Fig. 2. Located only 30 minutes from downtown Detroit, the new airport will provide ample runways and all modern conveniences for postwar air traffic.

Some 2,000 passengers arriving or departing can be handled in the building during peak hour loads, plus an additional 3,500 visitors.

Two doors from the passenger concourse will give access to three covered passageways from which conveniently located stairs will lead down to 25 plane-loading stations on the field. Offices for field management, airlines, weather bureau and communications will be located on the second floor, above the passenger concourse. Provisions also will be made for a 400-seat newsreel theater on this floor. A field-control observation tower, with full vision of the field, will be located immediately above the second floor.

Four airline hangar buildings, providing some 60,000 sq. ft. of floor space are included in the proposed plan; two on the east and two on the west side of the field. Other proposed facilities include a 1,500 hp. boiler capacity power house, parking space for 800 cars, a small repair garage, gasoline service station, and cargo buildings, which also may be used for large private planes.

Total estimated cost of the entire project in its full stage of final development is $20,000,000, including land. Initial construction, however, adequate for present day and immediate future airline terminal operation, will require about $10,000,000.

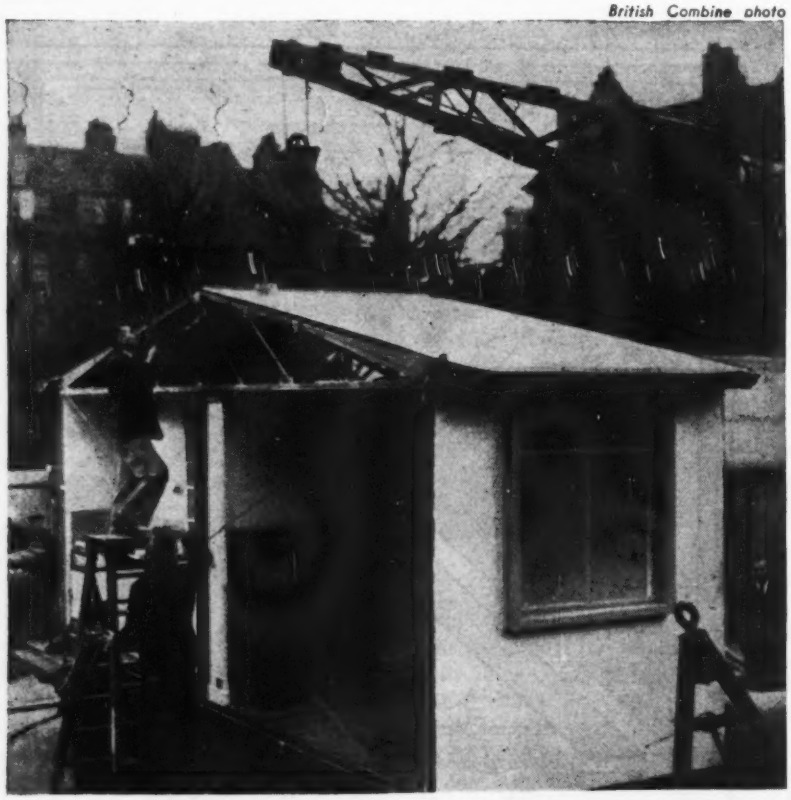
The project is being designed by the staff of George R. Thompson, city engineer of Detroit, under the supervision of William J. Wallace, engineer of design; Raymond K. Jepson, associate architect; and William C. Rudd, mechanical and electrical engineer.

British to Use Aluminum Alloy For Prefabricated Houses

The British Ministry of Works has announced that the aluminum house, designed by the Aircraft Industries Research Organization on Housing, has now passed its technical tests. As soon as the Ministry of Aircraft Production can allot the necessary factory capacity, extensive production will be started.

As described in *The Surveyor and Municipal and County Engineer*, April, 13, 1945, p. 208, the house comes in four sections. Within a few hours of their arrival on the site, these four sections are coupled together and the house is ready for occupation. The sections are 22 ft. 5½ in. long, 10 ft. 8½ in. high and 7 ft. 6 in. wide. This size was determined by considerations of speed of erection and transport regulations.

British Combine photo



The houses are prefabricated and delivered in four sections. This is a kitchen and living room unit. Note aluminum roof truss construction.

Plan and construction features

Roughly equivalent to that of other approved types of temporary housing, the aluminum house is planned as a single story building with front entrance and hall giving direct access to the living room, bathroom and both bedrooms. The floor frame is made of aluminum alloy faced with timber floorboards. Insulated with a lightweight aerated cement, the walls are faced externally with alloy sheet painted with a rough-cast finish of stone appearance and internally with plaster board and spray-painted in color. The roof is faced externally with aluminum alloy sheets packed with cork, which gives thermal insulation and eliminates drumming. A high standard of thermal and sound insulation is maintained throughout—both in the exterior structure and internal partitioning. It is believed that in these respects the structure should be better than the standard 9-in. brick wall and the roof better than tile and roof felt.

The Ministry of Works points out that the most obvious advantage of using aluminum alloy for prefabricated house construction is its lightweight for transport and handling. Experience in the use of these alloys in aircraft has shown that they can be subjected to such strains. Further, a house made of aluminum is expected to stand up well under weather conditions in Britain.

Outline of Contract Procedure In Building Construction

J. P. H. Perry
Vice-President, Turner Construction Co.
New York, N. Y.

***Contents in Brief**—There are today three accepted methods for undertaking construction of industrial buildings: (1) The traditional one in which architects or engineers prepare plans and specifications and a contractor is selected later; (2) delegation of the job to a contractor who designs as well as builds; and (3) hiring a contractor who is responsible for general execution, but retains an outside architect or engineer to provide design service. The following is an abstract of Mr. Perry's discussion before the American-Soviet Building Conference, held in New York City on May 5, 1945, under the auspices of the Architects' Committee of the National Council of American-Soviet Friendship, Inc.*

WHEN AN INDUSTRIAL COMPANY in the United States decides to build a new factory, it may choose one of three widely accepted methods for initiating the project. Fundamentally, these methods differ in the manner in which they combine planning, design and erection.

An outline of the development and use of these methods could well start with an examination of the situation at the beginning of the 20th Century. At that time an industry needing a new factory, generally followed building practices that had prevailed for generations. An architect or engineer was engaged to prepare plans and specifications, bids were taken competitively from a number of contractors and the contract was usually awarded to the low bidder.

About the time of World War I, a contractor in the Middle West began advertising what has become known in the trade as the "Package Service". This contractor claimed great merit in combining design and execution. He has been successful the past 30 years and has done many millions of dollars of fine work under contracts which required him to be father, mother and wet nurse—all in one person.

One difficulty of the Package Service method has been that the contractor who sells it antagonizes architects and engineers, men who in this country largely control building construction work. Furthermore, the Package Service method has the weakness that it requires the owner to "put all his eggs in one basket." Many corporations and industrial executives, and particularly government agencies, hesitate to eliminate outside auditing or checking.

Method puts contractor in control

Developing with World War II and in recognition of some of the merits of this Package Service method of construction, another practice evolved successfully—that in which the building contractor is given the primary responsibility for getting the job done. The owner holds the contractor responsible for recommending an appropriate architect or engineer (or both) to work with the owner in designing the structure. In this setup the designer may be paid either by the contractor or by the owner. The merit of this approach compared to the Package Service method is believed by some to lie chiefly in the fact that no one contracting company can have in its employment the top experts in all types of building design or the best specialists in production line layouts or in respect to important building details.

This "Cooperative Contractor" method, if it can be called that, permits the owner, on the advice of his selected contractor, to pick the ideal engineer rather than to take one who is at the moment available. It has been the privilege of the Turner Construction Co. to do many millions of dollars of work under this method.

New forms of contract

The federal government in World War II, in carrying out about $25 billion of building construction programs, developed two new forms of contract. (Normally, the government does its work by lump-sum competition or in emergencies on a cost-plus basis.) One of these methods is the A-E-M (Architect-Engineer-Management) contract, which in its essentials reflects the philosophy of the Package Service school of though by combining individual engineers, architects and construction managers into a single entity to handle a given job. The other contract procedure is the Engineer-Constructor form, which more nearly follows the Cooperative Contractor method in that a contractor and an engineer who are brought together to do a job, with the contractor usually in the dominant position.

Another problem to be faced in undertaking an industrial building project is the selection of the type of contract to be used. On private work in this country the form of contract predominantly used is the lump-sum competitive contract. In the past 30 years, however, there has been a very wide acceptance of the cost-plus method of doing work.

Many owners like to compromise between these two methods. This has resulted in the adoption of the cost-plus guaranteed-total form of contract. Under this contract the contractor agrees that if the actual cost of the work is less than the guaran-

teed total the difference or saving will revert to the owner. Frequently an owner, being psychologically wise, gives the contractor a share in these savings as an incentive to perform the work economically.

Selection of contractor

When the plans and specifications have progressed sufficiently to start construction, there are available several solutions to the basic problem of "how to do it." The predominant practice in this country is to entrust the work to a general contractor and hold him, either directly or through the architect, responsible for the execution of the entire project.

However, there are those who believe that they get better results by doing the work by separate contracts. Under this method there is no general contractor, at least in name, (though actually the owner or the architect attempts to exercise his functions); but the owner through his own construction or engineering departments, if he has such, or through his architect, breaks the work up into as many as 50 or 60 separate contracts. These contractors would normally be subcontractors to the general contractor.

The method of separate contracts gives the owner a chance to do some sharp buying. It requires very capable management to coordinate these various contracting concerns to be sure that there are no loop holes. Few industrial concerns are willing to organize within themselves to undertake this type of management and supervision. They prefer to "stick to their last" and devote their executive management energies to manufacturing their own product or doing their own business. They are willing to let an experienced, able general contractor earn a reasonable profit by rendering this broad service.

European and U. S. methods differ

As to construction methods in the field, I suspect that American practice varies from European practice largely because here labor is expensive and materials relatively cheap, whereas the reverse is true in Europe. Many times I have had submitted to me methods of construction, or for that matter of design, of industrial buildings that enjoyed substantial vogue in European countries. An analysis of their adaptability to American practice usually showed them ill-suited or uneconomical. The rock on which these ventures usually cracked up was our labor costs.

Field methods used in industrial building construction are largely built around an effort to save labor or to get greater production from labor, which is another way of saying the same thing. We increasingly tend to mechanize our jobs to a greater extent than in the past. On the other hand it has been our experience that many building contractors have overmachanized their building jobs.

Trend toward specialization

Industrial buildings are tending to become more intricate. Witness, for example, the increasing use of air conditioning, ventilation, complicated lighting and more flexible power distribution systems, together with soundproofing, greater socialogical features, such as cafeterias and attendant kitchens, locker rooms, washrooms, first-aid and hospitalization facilities, recreation lounges, athletic facilities and playgrounds in larger plants. These features have increased the trend towards specialization of the industry. This is responsible for the increasingly wide break-down of a building job into operations for a multitude of sub-contractors.

The successful handling of large industrial building operations by the bigger and better known general contractors is due, in my judgment, to an insistence upon adequately staffing the job supervisory force. Our philosophy has been that the superintendent in the field should have primarily but one responsibility, that is to get production out of his men. He should be burdened with a minimum of paper work. His problems of interpreting plans, purchasing, expediting materials, store-keeping and accounting should all be controlled for him by a strong headquarters staff. The Turner Construction Co. has been a firm believer in the Army idea of "a strong line and a strong staff." Headquarters control of accounting, purchasing, expediting, requisitioning has helped us get good costs and expeditious handling of the work.

The temptation of some of the smaller contractors to skimp on their job-supervisory force is readily understandable, but if succumbed to is usually fatal in its results over the years. We are firm believers in replacements—in having an experienced, adequately trained No. 2 man immediately available to step into No. 1 man's place.

Another vital element in the successful management of some of the larger American building construction companies has been their general policy of maintaining their organization. But many companies, of course, still operate essentially on the hire and fire basis—picking up men when a new contract comes in, and if no work is available when the job is done laying them off or putting them on part-time.

Cost control is basis of success

A fundamental to the success of any construction operation is cost control. I think if I had to put ahead of all others one requirement that a contractor must have to be successful I would select cost control—knowledge of costs and how to interpret them.

The time to use costs is at the time when they are incurred. Many contractors keep cost records in such shape they are available for use generally only at the end of the job and are primarily studied as a basis for bidding on the next job. The theory of cost control from the inception of the Turner Construction Co. has been that while costs are useful as a basis for bidding the next job, their greatest value is as a tool to control cost of work while it is in progress. We get out a unit cost every two or three weeks and an indicated outcome every six weeks on all our work.

Multiple shifts uneconomical

While American building construction may be notable for the speed that has been attained, it is my judgment that double or triple shift work seldom pays, either in dollars or in time. We have found, on large operations at least, that with a long (9 or 10 hr.) single shift, we can get better production and far better costs than we can by operating on two shifts. On building work the third, or night shift, is practically never justified in our experience.

To produce one good industrial building each week—week in and week out—requires, we have found, that the contractor organize to furnish rigid self-inspection. No inspection force of the owner or architect can get out of a contractor what he himself does not intend to give.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

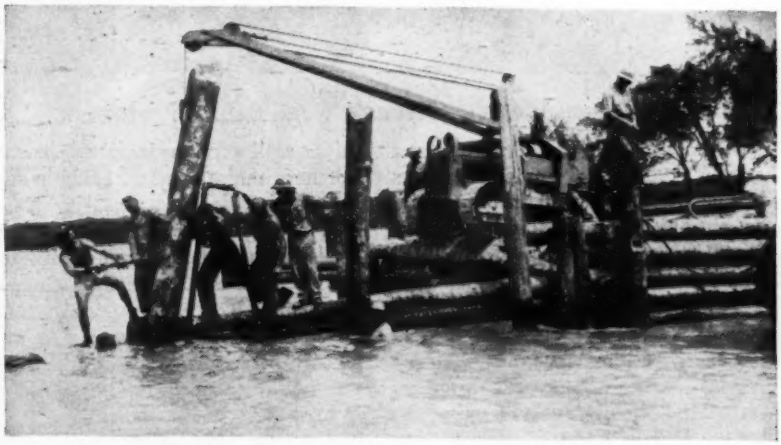
Finger-Lift and Truck Combined

A strongly built finger-lift rack, at the rear of a dump truck body with a hinged mounting between lift-frame and chassis, has been developed for use at the Navy's ABCDs (advanced base construction depots) where quantities of heavy freight packages have to be unloaded, stacked or moved about. This rig combines the advantages of a large capacity finger-lift with the speed and mobility of a motor truck. It saves the time and labor of rehandling where a haul of some little distance is involved. With this rig only one operator is needed to pick up, transport, and stack heavy freight packages.

Incentive for developing this combination rig came about when finger-lifts of conventional types were found very useful in the ABCDs but could not substitute for trucks when any considerable distance of delivery was involved, such as a haul of a mile or two to warehouse or shipping point.

The first finger-lift rack was built from materials available in the Seabee machine shop. It was made heavier and stronger than the smaller commercial equipment. Power for its operation is taken from the truck engine. Modifications of the first one include a clamp to hold the load in place in the horizontal position and a sheave location nearer the chassis level, close to the hinge point.

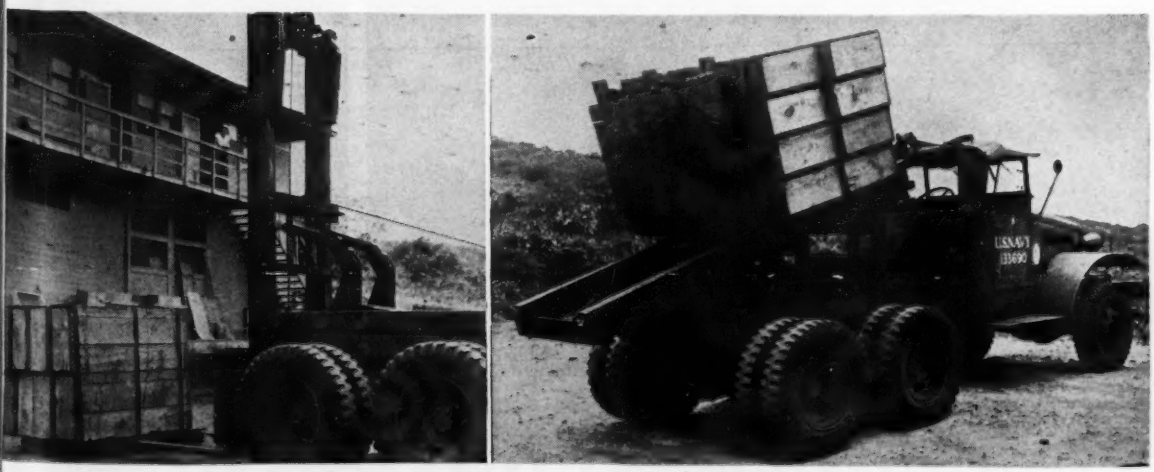
Credit for originating the idea is given to Homer E. Gray, Chief Machinist's Mate of the 92d Naval Construction Battalion.



Water Jet is a Substitute for Piledriver

A 3-in. portable fire pump and a small, tractor-mounted crane served as equipment for a Seabee detachment that had to build a wharf suitable for launches and other small craft. Crib construction was chosen because coconut logs were plentiful and wave action was a factor. The pump was a 500-g.p.m., trailer-mounted outfit powered by a gasoline engine. It was connected to a 3-in. fire hose terminating in an iron pipe convenient for jetting. The crane brought the piles up into position and held them while the jet was used to sink them into the bottom. The water was fairly shallow (note standees that aided in placing) and a penetration of about 8 ft. was obtained in 15 min. In this way a timber crib structure 30x100 ft. in plan was speedily built which served its purpose well.

The work was done by the 60th Naval Construction Battalion.



Finger-lift rack is being moved into position for lifting a load. Right: After the load has been raised vertically, the hinged frame tilts down over truck body. Speedy movement and mobility are the advantages of this rig.

Bridges on Tropical Streams Need Debris Protection

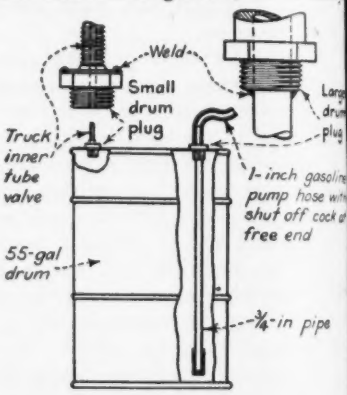
A line of pile dolphins across a stream 100 ft. or more above a bridge trestle is useful in the tropics as an aid in protecting the bridge from damage by drift accumulations. Floods in streams on Guadalcanal, where the accompanying picture was taken, sometimes bring down trees 5 to 8 ft. in diameter and 80 to 100 ft. long, with roots and branches attached, resembling a floating island. Although it is not possible to intercept all such drift with a string of pile dolphins, many of them do lodge there long enough for something to be done by the crew of watchers maintained at bridges during a rising flood.

Wire ropes are strung on three levels across the stream along the line of dolphins. Whenever dangerous drift lodges, a man goes out and attaches to it a wire rope that can be used by a tractor on shore to work the floating menace loose and get it in to shore. Later the drift is passed between the bents of the trestle under control or it may be broken up, by dynamite or otherwise, into smaller and less dangerous sections.—N.A.B.

Reducing Work of Removing Oil From Storage Drums

A method developed by Corporal Frank McMahon, Jr., member of a parts supply company in the Southwest Pacific area, reduced greatly the work of army crews in servicing cranes with fuel supplied in 55-gal. drums. The scheme simply involves the addition of an inner tube valve to the drum, through which air can be fed to build up pressure. The procedure is illustrated by the accompanying drawing. When employing this method for removing fuel from the tanks, caution is needed to use only sufficient pressure to establish a satisfactory flow of fuel.

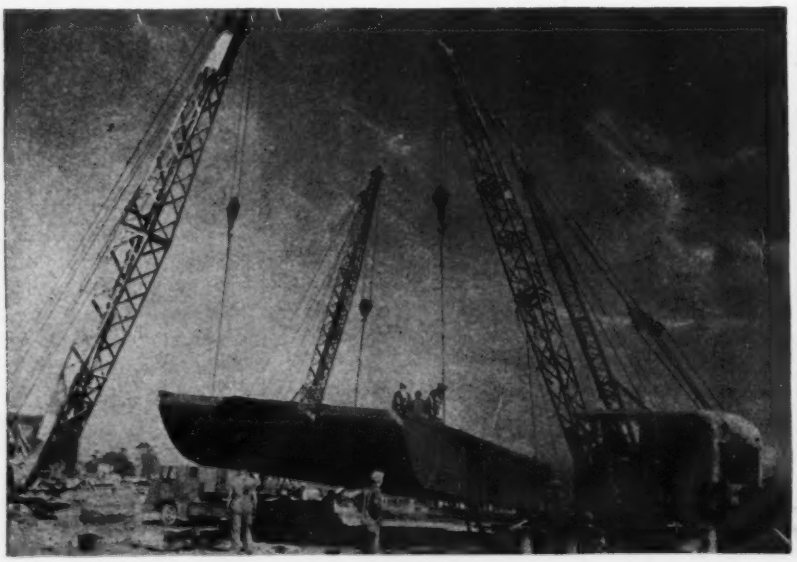
The information was made available through the courtesy of the *Maintenance Engineer*, which is published by Maintenance Publications Office, War Plans Division, Office of the Chief of Engineers, U. S. Army.

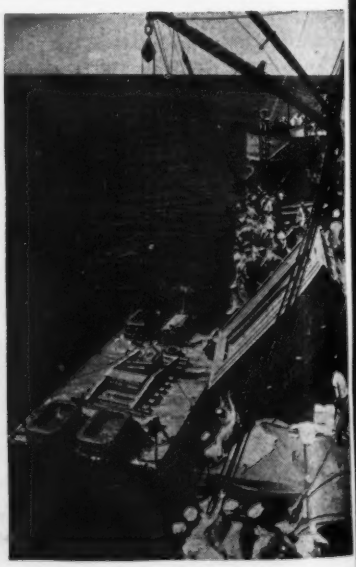


Pontoon Cell Barges Shipped Ready For Use

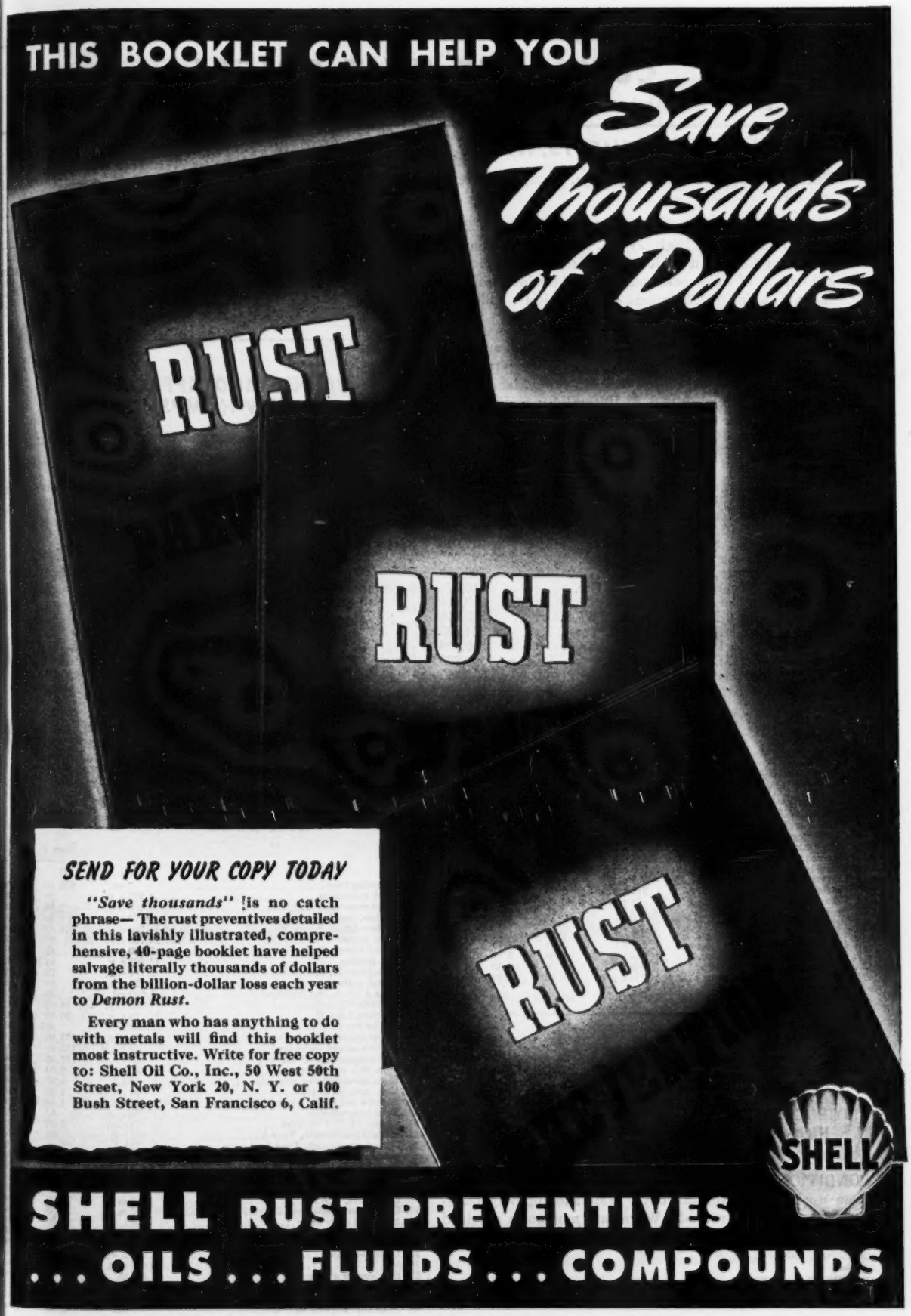
The pontoon cell barges so widely used by the U. S. naval construction battalions can be put together quickly in the field but sometimes this is not fast enough to suit the emergency needs for unloading freight in enemy territory. To speed freight landing, barges up to 3x7 size (that is, about 15x35 ft. in plan and having a capacity of 100 tons) are sometimes put aboard the steamers bodily, all ready for launching.

The photographs were supplied by Comdr. Jay S. Leland, Belt, Mont., officer in charge of a naval construction regiment.





A pontoon barge three cells wide by seven long, lifted by four cranes, awaits trailer that will take it to a ship. Right: The same barge, being unloaded bodily from the ship, for use in lightering supplies ashore.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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

HIGHWAY IMPROVEMENTS, WASH.

OWNER: Washington Dept. of Highways, Olympia; Clarence Hickey, director.

PROJECT: Grading, clearing, grubbing and draining 2.081 miles of Primary State Highway No. 1, in Cowlitz County, from Chicken Coop Inn to Kalama, Wash. Work includes 296,220 cu. yd. of solid rock excavation. Also involves slope treatment, finishing 104.7 stations of the roadway, and erecting necessary structures.

CONDITIONS: Contractor to furnish all materials and complete work in 180 calendar days. Rail and highway transportation facilities available. Wage rates are: skilled labor, $1.35 to $2.00 per hour; semi-skilled, $1.10 to $1.40; and common, $1.15 to $1.25.

BIDS: Twelve bids were received December 28, 1944, ranging from the contract low of $262,748 to $561,328.

LIST OF BIDDERS:

1. Strong & Macdonald, Inc., Tacoma, Wash. (contract) $262,748
2. N. Fiorito Co., Seattle, Wash. 277,018
3. Erickson Paving Co., Seattle, Wash. 297,902
4. Goetz & Brennan, Seattle, Wash. 309,558
5. Kuckenberg Constr. Co., Portland, Ore. 310,128
6. Northwest Constr. Co., Seattle, Wash. 319,015
7. Sound Constr. & Engr. Co., Seattle, Wash. 330,060
8. D. F. Whittaker, Seattle, Wash. ..... 344,220.
9. E. C. Hall Co., Portland, Ore. 360,939
10. K. L. Goulter & Co., Seattle, Wash. 390,226
11. Guerin Bros., South San Francisco, Calif. 522,469
12. L. Romano Engr. Co., Seattle, Wash. 561,328

Item	Quan	Unit Prices (1)	(2)	(3)
1. Clearing	33.42 ac.	$300.00	$300.00	$300.00
2. Grubbing	16.11 ac	300.00	300.00	300.00
3. Common excav. (incl. 600-ft. haul)	15,670 c. y.	.50	.73	.76
4. Solid rock excav. (incl. 600-ft. haul)	296,220 c. y.	.70	.73	.76
5. Common trench excav. (incl. 600-ft. haul)	2,400 c. y.	.50	.75	1.20
6. Overhaul on above items (stations)	241,825 c. y.	.01	.01	.02
7. Overhaul on above items (miles)	2,201.09 c. y.	4.00	5.00	6.00
8. Structure excavation	2,010 c. y.	2.00	1.50	3.50
9. Slope treatment	9,715 l. f.	.15	.10	.20
10. Finishing roadway (sta.-100-ft.)	104.7 sta.	15.00	15.00	15.00
11. Gravel backfill in place	360 c. y.	3.00	6.00	3.50
12. Cr. stone surf. base course	280 c. y.	5.00	5.00	3.00
13. Cr. stone surf. top course	210 c. y.	5.00	5.00	3.00
14. Class A concrete	78 c. y.	40.00	35.00	55.00
15. Steel reinforcing bars	16,870 lb.	.07	.06	.10
16. Rein. conc. rt.-of-way markers	28 ea.	5.00	3.00	5.00
17. 4-in. wrought iron water pipe	210 l. f.	2.00	1.50	1.75
18. 12-in. conc. or vitr. clay culv. pipe	120 l. f.	1.00	1.10	1.00
19. 18-in. std. rein. conc. culv. pipe	645 l. f.	3.00	2.20	2.50
20. 24-in. std. rein. conc. culv pipe	408 l. f.	4.00	5.50	3.50
21. 36-in. std. rein. conc. culv. pipe	144 l. f.	8.00	8.00	15.00

HIGHWAY, TEXAS

OWNER: Texas State Highway Comn., Austin.

PROJECT: Hot-mix asphaltic concrete paving 9.208 miles of U. S. Highway 69 in Hunt County, Tex., from 3.1 miles south of Greenville to Rains County Line (Sections).

CONDITIONS: Contractor to furnish all materials and complete work in 120 working days. Rail and highway transportation facilities available. Wage rate minimums specified are: skilled labor, $1.00 per hour; semi-skilled, 75c.; and common, 50c.

BIDS: Four bids were opened February 28, 1945, ranging from the contract low of $138,292 to $143,265.

LIST OF BIDDERS:

1. Texas Bitulithic Co., Dallas, Tex. (contract) $138,292
2. Uvalde Construction Co., Dallas, Tex. 140,331
3. Brown & Root, Inc., Houston, Tex. 142,915
4. Gaylord Construction Co., Houston, Tex. 143,265

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Type E (modified) aggregate	5,620 ton	$4.71	$4.64	$5.00
2. Local sand aggregate	20,100 ton	3.79	3.90	4.00
3. Asphalt	1,841 ton	18.00	18.20	17.10
4. Tack coat	14,737 gal.	.17	.16	.15

BRIDGE AND APPROACHES NEW HAMPSHIRE

OWNER: New Hampshire State Highway Dept., Daniel H. Dickinson, Concord, chief engineer.

PROJECT: Construction of reinforced concrete, stone-faced, single-span bridge between Rochester, N. H. and Lebanon, Me., over Salmon Falls River. Length of span is 80 ft.

CONDITIONS: Contractor to furnish all materials and complete project in 150 working days. Rail and highway transportation facilities available to site. Prevailing wage rates are: skilled labor $1.10 per hour; semi-skilled, 85c.; and common labor, 75c.

BIDS: Fifteen bids were received January 11, 1945 ranging from the contract low of $74,070 to 114,787.

PARTIAL LIST OF BIDDERS:

1. O. W. Miller Co., Inc., Ludlow, Mass. (contract) $74,070
2. Kenneth E. Curran, Littleton, N. H. 75,243
3. Coleman Bros. Corp., Boston, Mass. 84,701
4. Tebaldi Supply Co., Inc., Indian Orchard, Mass. 85,391
5. Charles W. Riva, Inc., Boston, Mass. 87,229
6. Engineering Serv. & Constr. Co., Boston, Mass. 87,721
7. Berke Moore Co., Inc., Brookline, Mass. 89,771
8. San-Vel Contracting Co., Littleton, Mass. 89,895

Item	Quan.	Unit Prices (1)	(2)
1. Removing trees	7 ea.	$25.00	$25.00
2. Earth excavation	4,373 c. y.	.35	.40
3. Ledge excavation	100 c. y.	2.50	1.00
4. Unclass. trench excavation	70 c. y.	1.50	2.00
5. Unclass. struct. excavation	250 c. y.	15.00	1.00
6. Earth borrow	23,700 c. y.	.40	.35
7. Gravel borrow, bridge	5,200 c. y.	.45	.50
8. Fine grading	12,968 s. y.	.08	.07
9. Gravel borrow, base course	2,784 c. y.	.70	.70
10. Gravel, surface course	723 c. y.	.80	1.00
11. Class A bitum. surf treatment	4,000 gal.	.20	.15
12. Concrete, Class A	956 c. y.	24.00	22.00
13. Concrete, Class B	16 c. y.	20.00	22.00
14. Reinforcing steel	75,280 lb.	.055	.05
15. Ashlar masonry (random)	81 c. y.	135.00	150.00
16. Ashlar masonry (capstones)	13.1 c. y.	115.00	150.00
17. Mortar squared stone masonry	11.4 c. y.	137.00	150.00
18. 15-in. rein. conc. pipe	56 l. f.	2.00	3.00
19. 12-in. spiral cast iron culv. pipe	12 l. f.	5.00	5.00
20. 12-in. corr. metal pipe	34 l. f.	2.00	4.00
21. Remove and relay 15-in. pipe	106 l. f.	1.00	3.00
22. Paint waterproofing	719 s. y.	.30	.25
23. Riprap, Cl. C, 1'-6" thick	472 c. y.	7.00	20.00
24. Straight granite curb, Type A	602 l. f.	1.75	2.50
25. Curved granite curb, Type A	72 l. f.	2.00	3.50
26. Wood guard rail (Sing. 6"x8")	803 l. f.	1.60	.80
27. Wood guard rail (Doub. 3"x8")	624 l. f.	1.35	.85
28. Wood post markers	6 ea.	3.50	3.00
29. Drop inlets, type B	1 ea.	75.00	100.00
30. Drop inlets, type D	3 ea.	75.00	100.00
31. Granite curb inlets, type B	2 ea.	25.00	25.00
32. 18-in. half circle sluice	68 l. f.	2.50	4.00
33. 4-in. concrete sidewalk	17 s. y.	3.00	3.00
34. Project markers	2 ea.	10.00	10.00
35. Loam, 6-in. deep	5,035 s. y.	.30	.45
36. Sod	1,025 s. y.	1.00	1.00
37. Fertilizer for grasses	1,595 lb.	.05	.05
38. Grass seed	110 lb.	1.00	.75
39. Bounds, furnish and set	6 ea.	15.00	10.00
40. Stone dust sidewalk surf. crse	7 ton	7.00	8.00

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The Shock-Shield is a set of *four* breakers—layers of rubber-coated rayon cords—between the tread and the plies. These breakers are in *pairs*, with the cords in each pair running parallel to each other—but with each pair running in opposite directions to give balanced strength. The breakers are cushioned with thick layers of special shock-resistant rubber.

Under impact, the cords in the breakers stretch together, *not* across each other, and return to their original position. The blow is *distributed* and *absorbed* by the rubber cushions; the shock passed on to the cord body is greatly reduced.

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B.F. Goodrich
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The Week IN ENGINEERING AND CONSTRUCTION

(Continued from page 58)

Earth-placing is pushed at Anderson Ranch Dam

Earth-placing operations on Anderson Ranch Dam, on the South Fork of the Boise River in southwestern Idaho, once again are in full swing as contractors on the job work toward the goal of bringing the elevation of the mammoth earthfill structure to a height sufficient to store water next spring.

Excavation for the 339-ft. high spillway, to be located on the left abutment, is about 90 percent completed, it is reported by R. J. Newell, acting regional director for the Bureau of Reclamation at Boise. The spillway will be an open-channel, concrete-lined chute, having a maximum discharge capacity of 20,000 cfs.

Material is hauled nearly two miles to the dam site from a high borrow pit on a 36-in. electrically-powered conveyor belt. Trucks pick it up and carry it to placing zones, where it is compacted in place by 20-ton sheep's foot rollers.

When completed, probably in the winter of 1947-48, the huge structure will contain 8,650,000 cu.yd. of clay, sand, gravel and rock. The construction schedule calls for 2,000,000 cu.yd. of embankment to be placed this year, bringing the total to 5,600,000 cu.yd., sufficient to permit the storage of 45,000 ac.ft. of water next spring. Ultimate capacity of the reservoir will be 500,000 ac.ft.

Construction is being carried on jointly by Morrison-Knudsen Co., Inc.; J. F. Shea Co., Inc.; Ford J. Twaits Co., and Winston Brothers Co.

• • •

Colo. tunnel pilot bore to be drilled this year

Preparatory to constructing a 23-mile tunnel through the Rocky Mountains in central Colorado to carry western slope water to Denver, a 300-ft. pilot bore will be drilled this year at the western portal near Dillon, Denver water department officials announced recently.

Called the Blue River Diversion Project, the tunnel will be constructed, except for exploratory work, after the war. During the past two years loose rock has been excavated at the portal to a depth of 254 ft. The pilot bore, to test rock composition and other factors, will probably be part of the completed tunnel, it was reported.

• • •

Connecticut River span to cost $6,000,000

The Connecticut General Assembly has reported favorably on a bill which would provide for construction of a new $6,000,000 highway bridge to span the Connecticut River between Old Saybrook and Old Lyme. A five-man commission will be appointed to plan the bridge and provide financing.

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Spring Tension — Less Wear

Maintains positive tension at all times sufficient to steady a clam shell bucket under any conditions. Functions perfectly with boom at any angle.

Operates on a spring principle. There are no weights, tracks, pins or carriages to wear out or get out of order. Large bearing and fewer sheaves save wear on cable.

Tagline is complete with fairlead and cable attached. Can be installed in less than one-half hour.

Most Crane Manufacturers have adopted Rud-o-Matics as standard equipment

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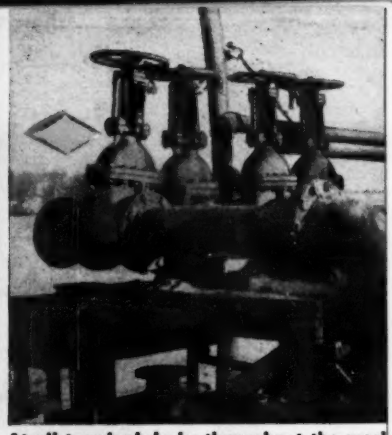
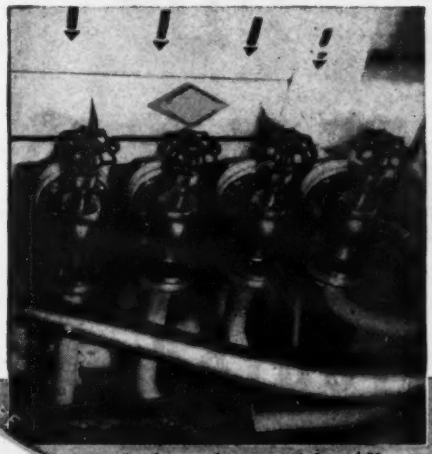
America's Fighting Men find "DIAMONDS" along the vital "fluid highway" of their mammoth war machine...

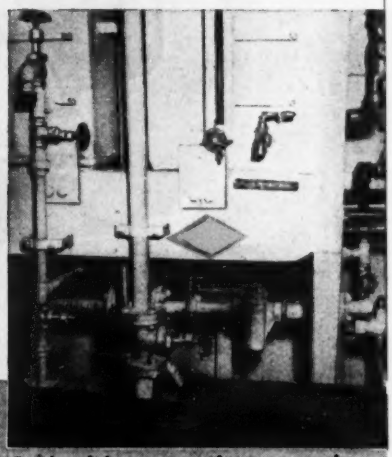
On a storage tank in the South Pacific.



At oil terminal docks throughout the world



In the engine room of an LCI.

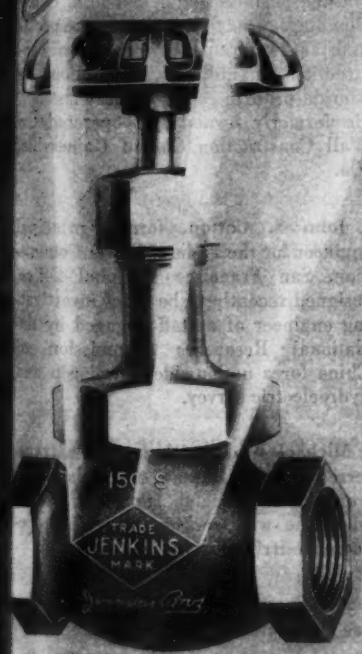


On the piping system of a cargo carrier.

REG. U.S. PAT. OFF.

TRADE JENKINS MARK

Jenkins Bros



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The Insley Excavator's crawler shoes are *extra* long and *extra* wide (at *no* extra cost) to provide better weight distribution and reduced ground pressure. That's why the Insley Excavator is "light on its feet" . . . fast and easy to handle in soft spots and tight spots alike.

You'll like these features of design and construction because—*like every Insley feature*—they contribute to lower cost yardage. For your new equipment—when we can again supply it—choose an Insley ⅜ or ½ yd. Excavator . . . available with five easily interchangeable attachments—shovel, crane, hoe, dragline and clamshell.

INSLEY MANUFACTURING CORP., INDIANAPOLIS 6, IND.

MEN AND JOBS

N. C. Hubbs, Marion County engineer at Salem, Ore., for the last 10 years has resigned.

Herman Ahlvers has been appointed Clallam County engineer at Port Angeles, Wash., to succeed Theodore F. Rixon, a pioneer civil engineer of western Washington who resigned recently at the age of 84. Mr. Ahlvers formerly supervised one of the county's road districts.

Martin J. McLaughlin, Chief of the Bureau of Water, Philadelphia, Pa., will take over the position of the late Seth M. Van Loan, as engineer of water supply rehabilitation and combine those duties with his regular work at no added cost to the city.

Walter H. Wallace, who has been associated with the Truckee-Carson Irrigation District in Nevada since 1907, for the last ten years as manager, recently announced his resignation, effective August 1. Mr. Wallace formerly was superintendent of maintenance.

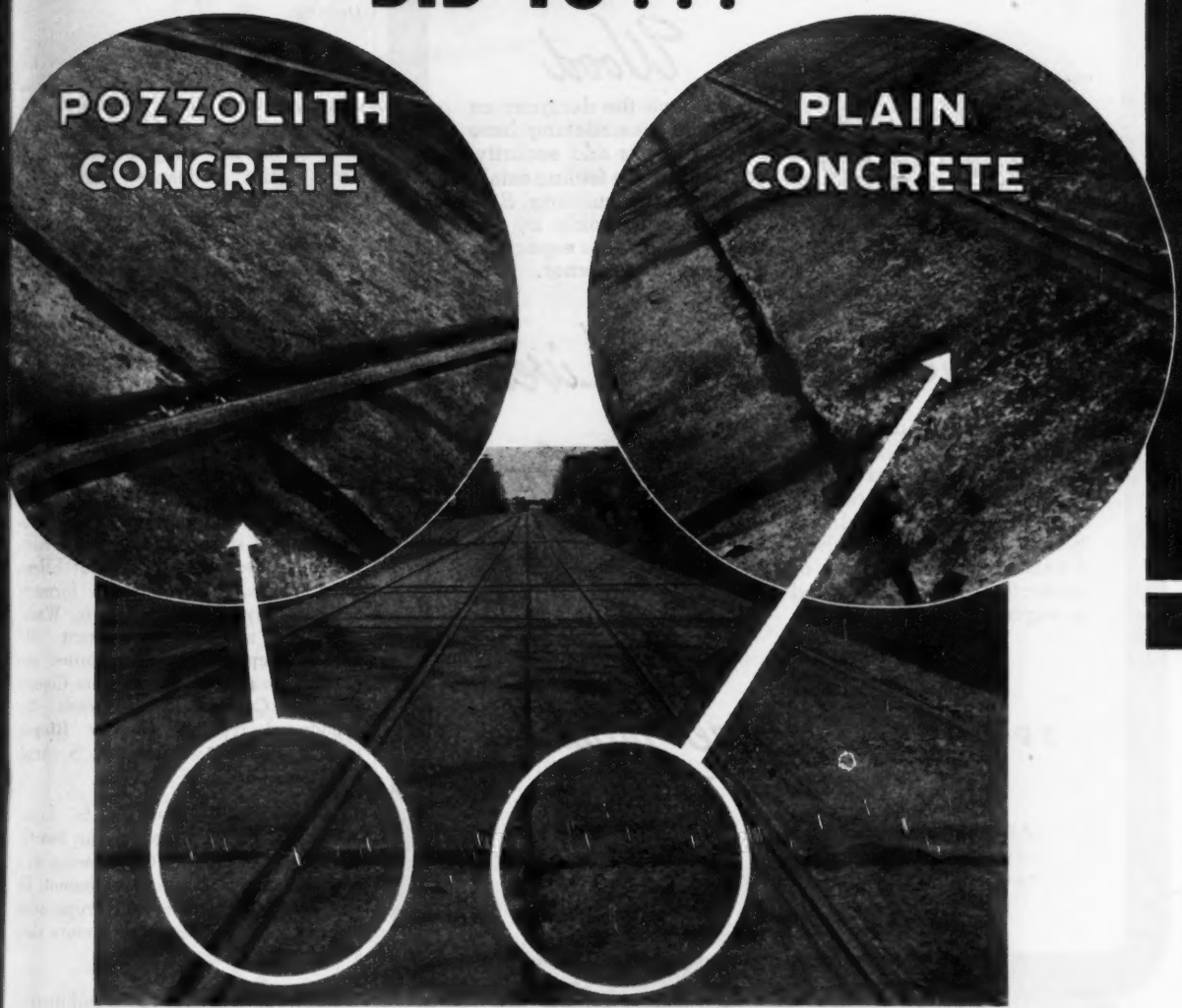
Maj. Mautin Wall of Asheville, N. C., has been made district engineer of Luzon, Philippine Islands. A graduate of the University of Florida School of Engineering, he has been in the Army since 1942 and was in charge of construction of McDill Field, Fla., and other airfields at Starke and Perry, Fla., and the hospital and stockade at Camp Blanding, Fla. He served as special assistant to the colonel in charge of construction of military installations in Florida prior to going overseas last fall. He formerly owned and operated the Wall Construction Co., of Gainesville, Fla.

John S. Cotton, former principal engineer for the Federal Power Commission, San Francisco Regional Office, resigned recently to be chief investigating engineer of a staff engaged by the National Resources Commission of China for a nationwide river-basin and hydroelectric survey.

Michael W. Drazich has been transferred by the Bureau of Reclamation from Altus, Okla., to Hamilton, Mont., where he will work on the Woodside-Florence irrigation project.

Robert S. Mayo of Lancaster, Pa., has been promoted recently from cap-

HERE'S WHAT 5 YEARS DID TO . . .



Devil Strips of Pozzolith and Plain Concrete after 5 years service for Bureau of Transportation, City of New York

rough five long, hard winters this street, paved rtly with Pozzolith concrete and partly with Plain ncrete, underwent freezing and thawing and de-icing emicals. The picture shows the greatly superior dura- ity of concrete made with Pozzolith *dispersed cement.*

ld performance of Pozzolith concrete proving its eat durability in all types of structures, as well as rement work, has been recently supplemented by an haustive investigation made by the Nation's leading testing authority. One series of tests showed that when exposed to freezing and thawing in sea water, Pozzolith concrete proved 400-500% more durable than Plain concrete.

Providing *increased* strengths, in adddition to great durability, Pozzolith marks a new era of concrete performance . . . an era of vastly improved concrete with impressive economies in initial construction and maintenance costs.

Write and we shall be glad to show you the facts.

THE MASTER BUILDERS COMPANY, LTD.

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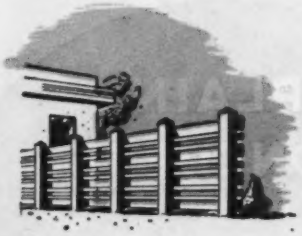
MASTER BUILDERS

DON'T BE FENCED IN BY OLD-FASHIONED IDEAS ABOUT

Wood



Wood gave the designer an effect he was seeking here — good looks and security, continuing the feeling established by the building. Savings made possible by the use of wood were especially pleasing to the owner.

THIS WOOD IS *Long Lived*

Wolmanized Lumber* is ordinary wood made highly resistant to decay and termite attack by vacuum-pressure treatment with Wolman Salts* Preservative. Fiber-fixation prevents loss of protection when the wood is exposed to the weather.

SPECIFY *Pressure Treated*

WOLMANIZED LUMBER

All of the usual advantages of building with wood are retained: paintability, lightness, strength, resilience, excellent insulating properties.

*Registered Trademarks

1649 McCORMICK BUILDING, CHICAGO 4, ILLINOIS

tain to major in the Marine Corps. He is executive officer of a Combat Engineer battalion somewhere in the South Pacific. Prior to joining the Marines he was a consulting engineer, specializing in tunnel construction, and co-author of the book *Practical Tunnel Driving*.

Maj. Homer D. Thomas, who formerly was in charge of engineer construction at the Iowa Ordnance plant, Burlington, Ia., will be resident engineer of the new project office at the Twin Cities Ordnance Plant, New Brighton, Minn.

Kenneth C. Fellowes, an engineer with H. G. Acres and Co. consulting engineers, Niagara Falls, Ont., has been temporarily released to serve as executive secretary and engineer to the Greater Niagara Postwar Planning Committee. **H. G Acres,** one of Canada's best known engineers, has been named chairman of the committee.

Philip B. Ekstrom, recently with the Civil Aeronautics Administration on airport construction work in Oregon, has been named staff engineer of the Kittitas soil conservation district at Ellensburg, Wash., **Ed Woodward,** formerly assistant city engineer at Kelso, Wash., has been named his assistant. Mr. Ekstrom replaces **Ellis Cummins,** who resigned to go with the Yakima Cement Products Co. of Yakima, Wash. Mr. Woodward replaces **Eugene Ringer,** now in training with the U. S. Army Engineers.

Harold Bartholomew of St. Louis, Mo., has been employed by the Seattle, Wash., City Planning Commission as a consultant on postwar development. He was consultant during the preparation of Seattle's zoning ordinance more than a score of years ago.

Robert E. Willems, Cleveland district engineer for the Ohio State Department of Highways for the last four years, has returned to the Akron municipal highway engineering staff. He has been in highway work since 1913.

Morgan W. Shuit of Coal Grove, Ohio, has been named to succeed Grover C. Kinley as resident Ohio state engineer for Jackson and Lawrence counties.

Charles M. Shearer has been named superintendent for the Fort Wayne, Ind., district, State Highway Committee of Indiana, succeeding Charles Rauner, resigned. From 1918 to 1928 Mr. Shearer was assistant highway superintendent of Allen County in charge of building roads and bridges, and in 1940 and 1941 was Allen County superintendent of roads.

For the TOUGH Jobs Ahead!

GAR WOOD ROAD MACHINERY

WITH ALLIS-CHALMERS DIESEL POWER

When the tremendous after-Victory program of road building and construction breaks, all present indications point to these conditions: 1. An abrupt change back to the prewar trends of competitive contracting. 2. Ever lower costs will become increasingly important. 3. The profitable business will go to the contractors who use the most efficient methods and machinery.

You can meet these conditions with Gar Wood Road Machinery and Allis-Chalmers Diesel Power. Here is an unbeatable combination that has what it takes to shove through the toughest jobs, fast—machinery that is dependable, economical, *proved*. Plan now to standardize on the complete line of Gar Wood Road Machinery. Get the facts from your Allis-Chalmers dealer.

SPECIFY GAR WOOD FOR OUTSTANDING PERFORMANCE

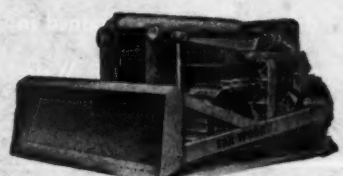
Cable Dozecasters

4-Wheel Hydraulic Scrapers

2-Wheel Hydraulic Scrapers

Heavy Duty Rippers

4-Wheel Cable Scrapers



Hydraulic Bulldozers

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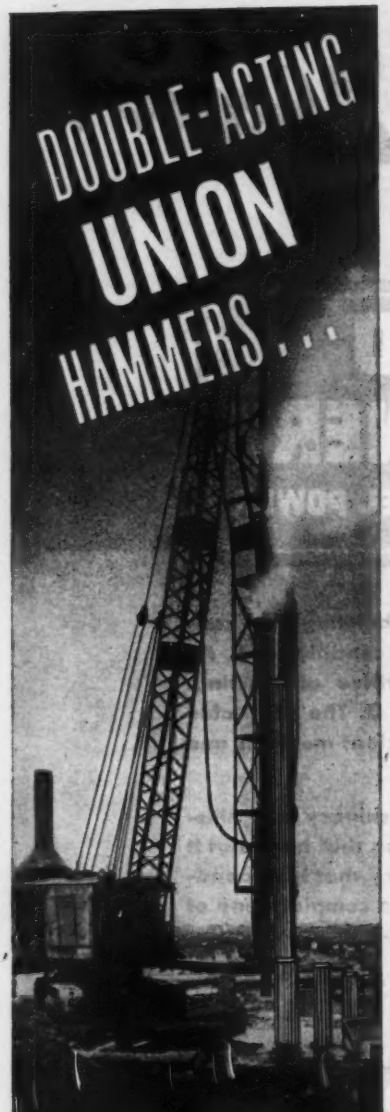

ALL the essential facts about Union double-acting hammers and how they increase the efficiency of all your pile driving jobs, are contained in our Catalog No. 184. Write for it today.

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New Aids to the Constructor

Transparent Sheet

Of many uses in the drafting room, a new transparent, adhesive sheet, Dulseal, is said to be extremely easy to apply. In addition to its protective properties, printer's ink takes well on the mat surface. Corrections may be made on it by erasing or rubbing with a moist cloth.

Dulseal is a tissue-thin, cellulose acetate sheet; its slow-acting adhesion makes it simple to apply with light hand-pressure. It is said to be water-, dust- and grease-proof, and is obtainable in 8, 12 and 24 in. widths, in 10 and 20-yd. rolls.—*Charles Bruning Co., Inc., 4757 Montrose Ave., Chicago 41, Ill.*

• • •

New Pump Line

Functionally designed to deliver as much as 50 percent more water than former Barnes pumps, new self-priming centrifugal pumps are now available from 1½ in. through 6 in. size, with many new and improved construction features. Among them are: positive high-speed automatic prime, with no moving parts in the pump mechanism; precision-ground, polished and case-hardened positive water seal; direct-in-line suction flow; non-clogging impeller.

These pumps undergo rigid factory tests for capacities, tolerances, alignment and engine performance.—*Barnes Mfg. Co., Mansfield, Ohio.*

• • •

Land Planer

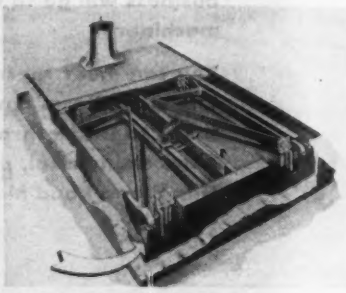
Automatically planing land from high spots and depositing it in hollows, the new Pacific Landplane is designed for one-man operation. Built in three 60-ft. models, each of which may be readily shortened to 30 ft. for use on exceptionally rough ground, this machine has interchangeable standard wheels, corners, side frames and hitches.

The Landplane has a boxed frame of heavy 5-in. steel channels. The four corners are supported on steel wheels carried in fork standards, and are equipped with Timken roller bearings. Bronze wheel bearings are scientifically lubricated and dustproofed. Heavy steel plate 36-in. wheels provide either 18 or 24-in. tread, and the draw bar demand ranges from 40 to 90 hp., depending on bucket adjustment.—*The Pacific Supply Co., 206 South Spring St., Los Angeles, 12, Calif.*

• • •

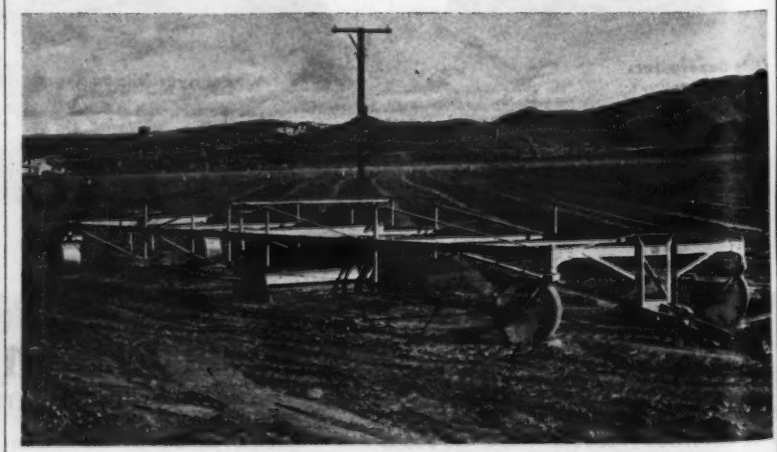
"Free Floating" Scale Platform

Built on a free-floating principle, Kron platform scales of both open and self-contained types will assure correct weight, regardless of where the load is



placed on the platform. This construction is said to prevent lateral platform motion from being transmitted to the lever system, and to absorb all swinging motion.

The self-contained dormant platform is extremely shallow, and fits into floors of wood, metal, concrete or composition requiring minimum of depth. The open



platform is built on a structural steel H-frame.—*The Yale & Towne Mfg. Co., Philadelphia 24, Pa.*

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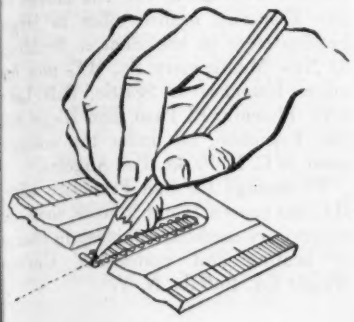
Ruler-Dotter

A device of multiple uses to draftsmen, architects and engineers, the new "Spee-Dotter" ruler enables them to draw accurate dotted lines in a split



second, the manufacturer asserts. This device also measures and makes parallel lines.

This ruler, of transparent plastic, fully graduated for ruling and measuring, is made in 8- and 12-in. size.—*C-Thru Ruler Co., 385 Capitol Ave., Hartford, Conn.*

• • •

All-Purpose Mower

Possessing a variety of travel speeds for all conditions and great stability for operation on extreme slopes and difficult angles, a new heavy-duty, general-purpose mower is mounted as a unit on a Model "B" Allis-Chalmers tractor.

A 5-ft. cutter bar, within full view of the operator, is raised and lowered by a power hydraulic lift. The inner shoe, outside the rear wheels, can be raised 12 in. by a hand lever. The sickle delivers a full cutting stroke ranging from 45 deg. above horizontal; when obstacles are encountered, the belt drive slippage protects the sickle.—*Allis-Chalmers, Tractor Division, Milwaukee 1 Wis.*

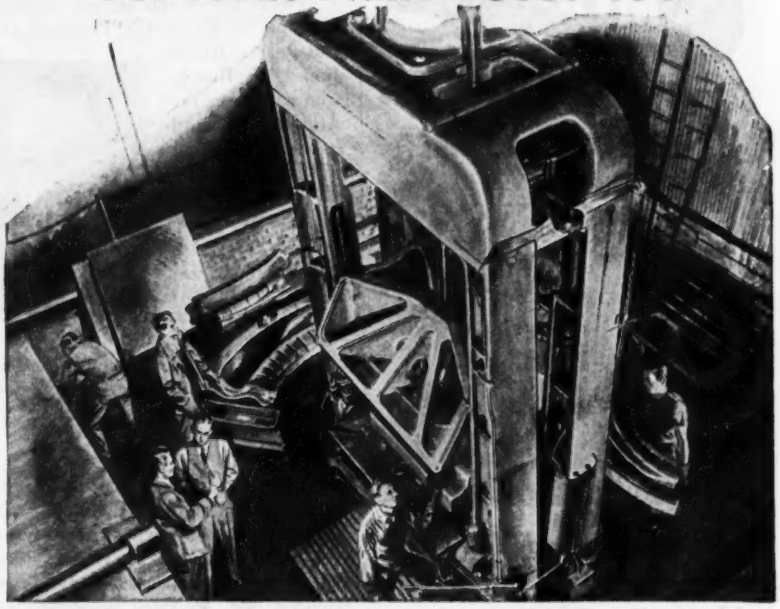
• • •

Direct-Connect Coupling

Specially adapted for use in testing operations, a new Wiggins direct-connect coupling fits over the end of any standard type AND 10056 nipple quickly and securely.

This coupling, of durable, light weight aluminum, comes in ¼, 5/16, ⅜, ½, ⅝ and ¾ in., and is said to find many applications with metering and valve gages, and hydraulic equipment.—*E. B. Wiggins Oil Tool Co., Inc., Los Angeles and Detroit.*

Air Express Saves $2,000 For Texas Plant – Cost $180



2 P.M. TUESDAY— Drop-hammer press breaks down in Texas war plant. Nearest replacement part is in the East, over three normal shipping days away. To avoid costly shutdown, the manager telephones for a new part via Air Express, even though the part weighs 250 pounds.

7 A.M. WEDNESDAY — Replacement part lands at Texas airport. Air Express charges were $180. But manager figures a saving to the plant of three precious production days and a saving of $2,000 in overhead by avoiding a shutdown.

FIGURE IT OUT yourself. How much would it cost you per day if your business — or a part of it — came to a standstill for lack of essential parts or material? Remember, the nation's inventory is within hours of your door, via Air Express.

Specify Air Express — Low Cost for High Speed

25 lbs., for instance, travels more than 500 miles for $4.38, more than 1,000 miles for $8.75, more than 2,000 miles for $17.50, at a speed of three miles a minute — with cost including special pick-up and delivery in all U. S. cities and principal towns. Same-day delivery between many airport towns and cities. Rapid air-rail service to 23,000 off-airline points in the United States. Direct service to scores of foreign countries.

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Write Today for "Quizzical Quizz," a booklet packed with facts that will help you solve many a shipping problem. Railway Express Agency, Air Express Division, 230 Park Avenue, New York 17. Or ask for it at any Airline or Express office.

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ON-THE-SPOT MIXING

with a JOHNSON PORTO-BATCHER

Mix Where Needed . . . Saves Time, Tires and Labor

Johnson's Porto-Batcher is a complete, *portable* highway batching plant that provides fast, thorough on-the-spot mixing for many types of jobs — *wherever located.* It's compact, tows easily, erects quickly and meets all state highway requirements. *In addition to pavement work* PORTO-BATCHERS *are used as follows:*

- As an auxiliary to a large ready-mix plant on large buildings, or bridge jobs, where distance from the main plant is a factor.
- By ready-mix operators who do not have a suitable site for a larger plant or who lack an established market for ready-mixed concrete in smaller communities.
- By general contractors who have a source of aggregate in construction of bridges, buildings and other concrete structures.
- By gravel producers interested in furnishing ready-mixed concrete for odd jobs or renting the machine to general contractors (along with the sale of aggregate).
- By road contractors who have occasional small street jobs or highway patching contracts.

Ready Mix Plant
Bulk Cement Handling Equipment
Cement Storage Bins
Concrete Buckets
Batchers

THE C. S. JOHNSON COMPANY
Champaign, Illinois
A KOEHRING SUBSIDIARY

Manufacturers' Activities

NEWLY APPOINTED factory representative for the Hyster Co., Portland, Ore., and Peoria, Ill., is James A. Roach, who will cover the Atlantic seaboard states, acting from his headquarters at the New York office, 90 West Street. Roach recently joined Hyster after several years with Mercury Manufacturing Co. in Chicago.

Added to his engineering training and materials handling experience are several years spent in the construction business.

HARRY B. MCNIECE, sales manager of Republic Stamping & Enameling Co., Canton, Ohio for the last seven years, has been promoted to vice-president, Ralph M. Fawsett, president has announced. Mr. McNiece, associated with the firm for many years, will retain his duties as sales manager.

ROBERT E. CRAMER, who joined American Steel and Wire Co., 35 years ago as a blueprint boy, has been named chief engineer of the Cleveland, Ohio, firm, a subsidiary of U. S. Steel Corp., succeeding E. J. Reardon, resigned.

NATIONAL TIMBER PRODUCTS, INC., will move its main plant from Los Angeles, Calif., to Eugene, Ore. The firm specializes in prefabricated buildings, long-span roofing, marine structures and bridges.

JACOB S. COXEY, JR., formerly secretary and first vice-president of Industrial Silica Corp., Youngstown, Ohio, has been elected president to succeed the late L. M. Hansen. P. Grant Forman, vice-president and works manager, was named first vice-president in charge of operations of the four plants, succeeding Mr. Coxey, and A. C. Lemke, treasurer, was named secretary-treasurer.

L. C. HENDERSHOT has joined the E. H. Kliebenstein Co. organization to sell Link-Belt speeder cranes to the industrial field in the New York City area.

ESHELBY F. LUNKEN, 54, president of The Lunkenheimer Co., Cincinnati, Ohio, valve manufacturers, died recently. He was a leader in business and civic affairs and had worked closely with the Committee for Economic Development, of which he was a member. He had been with the company for 35 years and had served as president for 26 years.

FOR MORE efficient handling of increasing business on the west coast, Ilg Electric Ventilating Co. has moved its San Francisco branch office to larger headquarters in the Sharon Building, 55 New Montgomery St., ILG now operates branches at Seattle, Salt Lake City, Phoenix, El Paso, San Diego and San Francisco, all under the management of C. E. Parks, Los Angeles.

To manage the San Francisco office, ILG has chosen James S. Rose, formerly supervisory methods engineer in charge of heating and ventilation, Curtiss-Wright Co., Buffalo, N. Y.

Production of Pacific Car and Foundry Co.'s Model E Carcowinch is to be expanded at Centerville, Ia., to relieve pressure in the Seattle plant, company officials announced recently.

The Seattle plant, which formerly built the M-4 Sherman tank will continue to build Carcowinches, double drum hoists and cardo logging equipment as well as its subcontracting wingspar job for Boeing Aircraft Co. Model E. Carcowinch is a single drum, free-spooling winch designed for installation on Allis-Chalmers Caterpillar Cletrac and International Crawler tractors. It was developed originally for the logging industry.

G. E. GATES has been appointed manager for the Western Machinery Co. at Denver, Colo., in charge of construction machinery sales and service for that region. He was formerly connected with the Edward F. Hale Co. of San Francisco, Calif.

TRACY V. BUCKWALTER, for the last twenty-five years chief engineer and vice-president of The Timken Roller Bearing Co., has retired under the company's retirement annuity plan. The company will retain his services as consultant.

Mr. Buckwalter joined the Timken Co., in 1916 as chief engineer after sixteen years with the Pennsylvania Railroad Co. in the shops in Altoona, Pa., where, among other things, he developed the motor baggage truck, from which resulted

ost of the motor-driven baggage ucks used by railroads in this coun- and abroad. For many years his ork with the Timken Co. included en- neering and development in the auto- otive and general industrial fields.

JOHN L. YOUNG, of Pittsburgh, Pa., o started his industrial career with e Timken Roller Bearing Co., Can- n, Ohio, has been elected to the newly- eated post of vice-president in charge engineering by the National Tube ., subsidiary of the United States eel Corp. He joined the United Engi- ering & Foundry Co. in 1936 and had en its vice president in charge of dustrial research and development. 1941 he was loaned as project man- er to design and construct the De- nse Plant Corp. Aluminum rolling ills at Trentwood, Wash.

JOHN F. CORKERY has been made ad- rtising manager of the Independent neumatic Tool Co., Aurora, Ill.

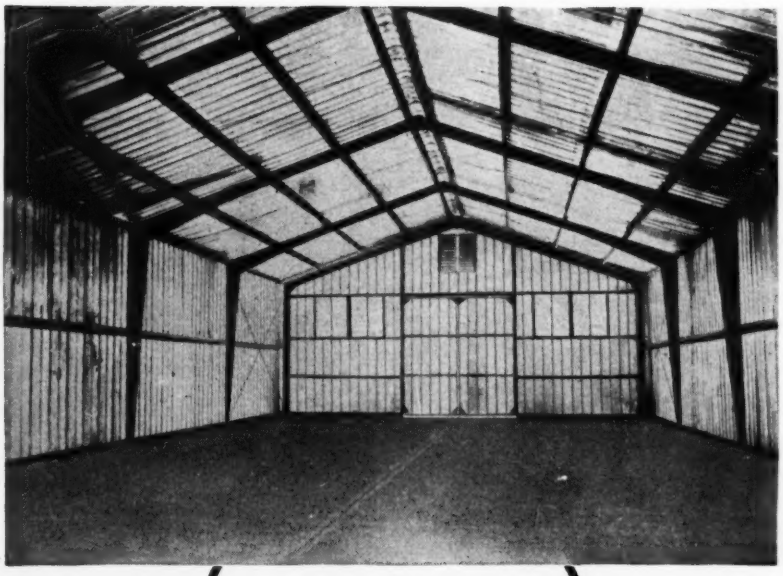
JAMES D. JONES has resigned as chief gineer of the Youngstown Sheet and ube Co., Youngstown, Ohio, to be- me a partner in H. A. Brassert & ., steel plant engineering firm, and ill make his headquarters in New York ity.

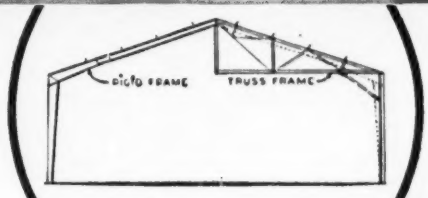
AMERICAN STEEL & WIRE CO., U. S. eel Corp. subsidiary, has announced e promotion of Myron E. Capouch as sistant manager of the wire rope and onstruction materials division, succeed- g B. S. Pease, who has retired after 36 ears service.

Mr. Capouch is a native of Chicago nd a graduate of the University of Illi- ois. He began his association with the mpany 19 years ago as a salesman. r. Pease started as salesman for e wire company in Chicago in Feb- ary, 1909. He had been assistant man- er of the wire rope and construction aterials division since 1937.

H. R. PITTMAN has been appointed easurer of the Vulcan Iron Works, Vilkes-Barre, Pa., following the resig- on of W. W. Moss. Mr. Pittman has en with the Vulcan Iron Works for years, serving successively as chief erk, comptroller, and in recent years both assistant secretary and assist- nt treasurer.

THE NAME of the Chamberlain Metal eather Strip Co., Detroit, Mich., has en changed to Chamberlain Company America. The company's products nd services, in addition to weather trips, include rock wool insulation, orm windows, caulking, insect screens, nd detention screens for hospitals and sychiatric institutions.





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STEEL BUILDINGS

Check off for planned and future industrial buildings the many advantages made available by the simplified design of Butler Rigid Frame (trussless) Steel Buildings. Product of wartime emergencies and problems, they represent one of the greatest improvements in industrial steel building design in many years.

Even before construction **begins, these buildings represent economies in—**

Savings of steel...
Compactness in transportation...
Reduction in shipping costs and space...
Complete mobility...

In construction **they provide—**

Simplicity of assembly...
Reduction in building height without sacrifice of interior cubage...
Great strength in relation to weight...

Functional efficiency **is vastly improved because trussless buildings—**

Allow more room for overhead trackage and chain hoists...
Reduce interference with ventilating and heat ducts, piping, etc....
Permit higher and larger interior structures...

Comparison of the Rigid Frame and conventional truss design in the drawing above confirm these advantages. Information on Butler Rigid Frame Steel Building construction is available for engineering study.

Address all inquiries to: 7418 East 13th St., Kansas City 3, Missouri, or 918 Sixth Ave. S. E., Minneapolis 14, Minnesota.

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STEEL BUILDINGS

STEEL BUILDINGS ... TANKS (Storage, Processing and Transport) ... FILTERS STILLS...DRY CLEANING EQUIPMENT...RURAL GAS SYSTEMS...SEPTIC TANKS GRAIN BINS...FARM EQUIPMENT and PRODUCTS OF OTHER METALS

SPLINED SHAFTS

The illustration above shows the cutting of a spline in a LIMA vertical swing shaft. Spline cutting requires costly precision equipment. It also requires longer time to complete the job —but when finished a more accurate fit, greater strength and longer life to the part is obtained. A keyway or a square shaft, would in a fashion, serve the same purpose, but the reversing torques or repeatedly applied torque would rapidly weaken the keyed or square shaft, consequently delays and costly repair bills would result. Splines cut from the solid is standard practice with LIMA. Not only do splined shafts have greater strength, but they also assure a positive union between the driving and driven part. They also make it possible to separate the parts without damage to either part. Tomorrow when you will be buying new material handling equipment be sure it is a LIMA and get greatest value from your investment.

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SHOVEL, CRANE or DRAGLINE

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LIMA

SHOVELS, ¾ YD. TO 5 YDS. CRANES, 13 TONS TO 100 TONS
DRAGLINES, VARIABLE

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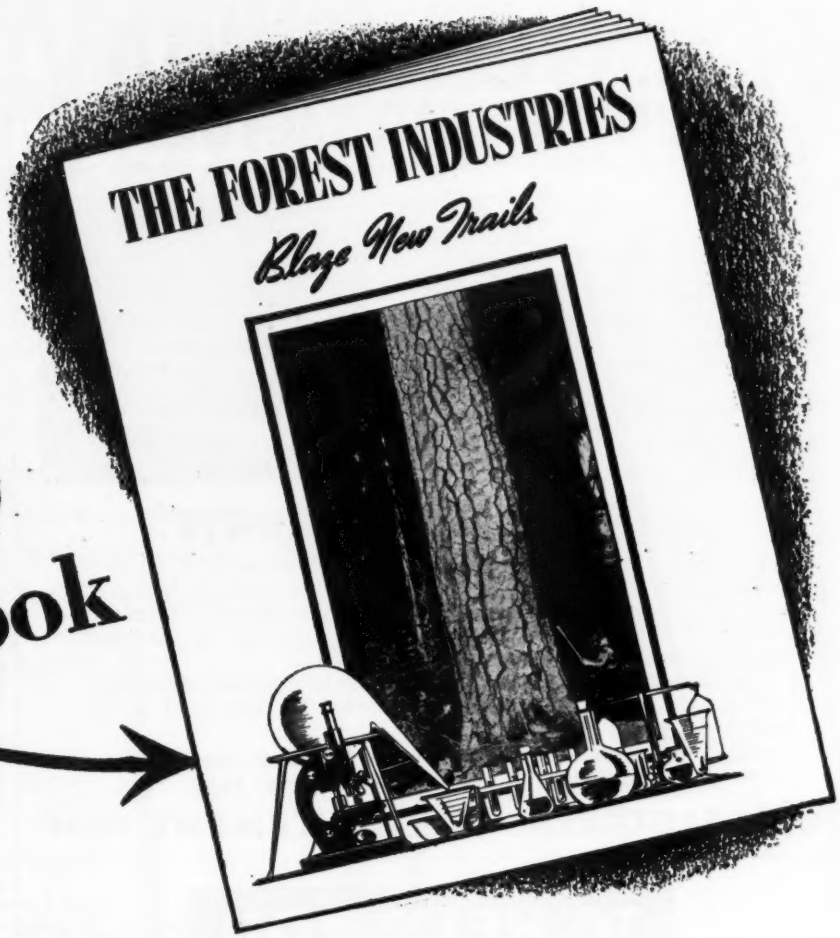

New TECO Services

This new book will be very helpful to executives, plant superintendents, chemical engineers, structural engineers and others in the wood-working, wood-chemistry and building fields.

It emphasizes the importance to all industry, of wood and its by-products and its derivatives —tells of new things ahead.

The new TECO services, now available through the Wood Products Development Shop and the Wood Chemistry Laboratory, are described for the benefit of those who may have problems concerning the physical, mechanical and chemical properties of wood and wood products. Learn how to make use of TECO SHOP-LAB equipment and technical staff in solving some of your postwar problems. Write at once for your copy—fill in and mail the coupon.

TIMBER ENGINEERING COMPANY OF WASHINGTON, D. C.

WASHINGTON · CHICAGO · NEW ORLEANS · SAN FRANCISCO

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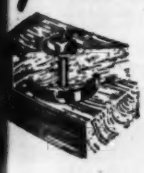

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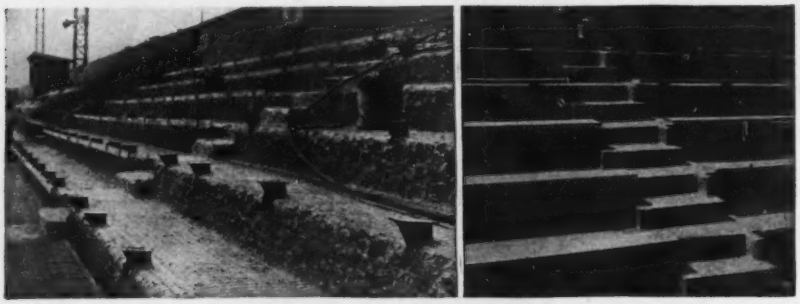
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



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The above pictures show a stadium at Sharon High School, Sharon, Penna. This concrete structure was built in 1933 and after eight years it was so weakened due to disintegration that repairs were essential. We restored this structure by an application of two inch mesh reinforced "GUNITE."

The view to the left shows the chipping and sandblasting completed with reinforcing mesh in place. To the right is the completed job.

Our Bulletin 2300 describes this and many other "GUNITE" jobs. Write for your copy.

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Incomparable when a rugged socket wrench is required, especially in tight places or long runs and where heavy leverage is needed. Used on pipe coupling, steel construction, timber bolting, culvert connecting, staybolt caps, cable clamps, grease plugs, countersunk plugs, tunnel liner plates, wood tank and silo bands, railroad track bolting, water gates, etc. A time saving tool in refineries and on construction jobs.

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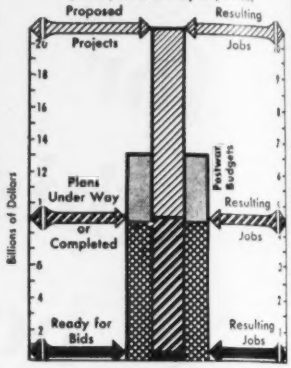
POSTWAR PROJECTS

POSTWAR ENGINEERING CONSTRUCTION VOLUME PROPOSED, PLANS UNDERWAY OR COMPLETED AND READY FOR BIDS

Status of postwar planning reported to ENR compared with annual postwar construction budget based on assumed National Income of $150,000,000,000 per year. (Jan. 1, 1943 to May 24, 1945)



(Assuming that $1 of construction volume produces 1 man-hour of labor, ½ on site)

Projects proposed for postwar construc have been published in these columns s January, 1943 as they have been reported ENGINEERING NEWS-RECORD.

Statistics based on these reports are used the Committee on Postwar Construction of American Society of Civil Engineers to mea the progress of plans for postwar projects.

The chart above shows, both in estimated lar volume and in jobs or man-years of la how fast this reservoir of future work is filling

WATER SUPPLY

PROPOSED WORK

N. Y., Parish—Village, installing wa sys. $70,000. State Aid Planning Funds lotted.

N. Y., Waterloo—Village, water sys. prvs. $125,000. State Aid Planning Funds lotted.

Tex., Houston—H. A. Kinney, Kurth Bld water lines, facilities for sub-division. C $15,000. Financing provided.

Tex., Houston—Hill P. White & Hu Realty Co., 3430 Leeland St., water facili for sub-division development. Over $50,0 Financing not provided.

Wash., Walla Walla—City, City Ha water mains, $75,000. Financing not pr vided.

Alta., Calgary—Municipality, covered re ervoir in South Calgary, $350,000.

PLANS UNDER WAY

Mont., Plentywood—City, City Hall, pl under way well, softening plant and wa sys. exten. $48,000. Bond issue approv Layne-Western Co., 3140 Snelling Av Minneapolis, Minn., consult. engrs.

Neb., Fremont—City, City Hall, water s imprvs., incl. main repairs, larger mai $120,000. L. Wright, engr. & supt.

★ **O., Lima**—City, City Hall, water res voir, test borings being made. $600,0 Land rights not cleared, legal obstacles be overcome, financing not provided. T. Monahan, Municipal Bldg., city engr. 3/16—ENR 4/6.

O., Seven Mile—Village, plans under installing c.i. water line. $40,000. Bond el tion in November. A. F. Kissenger, P National Bank Bldg., Hamilton, cons engr.

O., Toledo—Lucas Co., Court House, wa line, at Toledo Airport. $23,500. C. Ha City-County Plan Comn., Court House, 2, engr.

Tex., Baytown—Harris County Water C trol & Impvt. Dist. 7, Baytown, plans completed rein.-con. underground wa storage tank $50,000; c.i. mains $25,0 Financing available. J. J. Rady, Insura Bldg., Fort Worth, consult. engr. CD 2/1 ENR 3/8.

★ **Tex., Galveston**—City, City Hall, feated $1,500,000 bonds, 30 in. wa distr. main between Alta Loma and G veston mainland; defeated $600,000 bo imprv., enlarging, extend WW. sys. J Rady, Insurance Bldg., Fort Worth, c sult. engr. CD 4/23—ENR 5/3.

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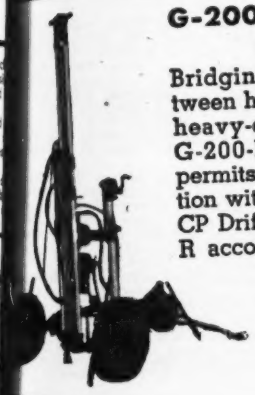

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In trench work particularly, CP Backfill Tampers quickly earn their cost by saving the time and labor involved in hauling surplus excavated material. For general tamping, CP-3 is recommended; for heavy tamping, CP-MM; for extremely heavy tamping, CP-4.

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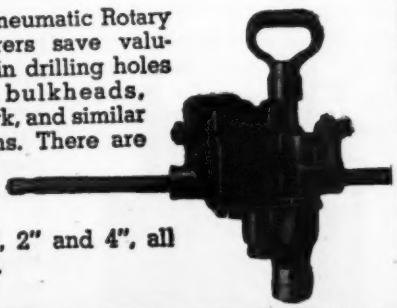

Chicago Pneumatic Rotary Wood Borers save valuable time in drilling holes in piers, bulkheads, trestle work, and similar applications. There are three sizes of CP Wood Borers, 1", 2" and 4", all reversible.

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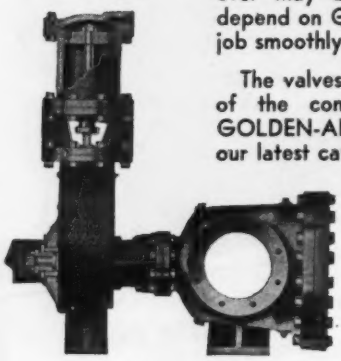
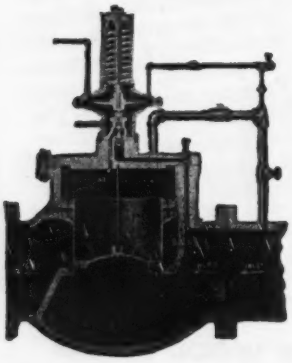
The valves described here are only an indication of the complete line. For more details on GOLDEN-ANDERSON Specialty Valves send for our latest catalog.



• Assure a full line opening without pressure drop on automatic services with the G-A CONE THRU-FLOW VALVE. In lieu of gate valves these can be supplied for manual operation. These valves are suited to most automatic services, including altitude, check, relief, etc. Four inch to seventy-two inch sizes are available.



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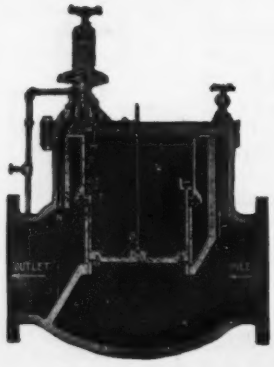


• The G-A WATER PRESSURE REDUCING VALVE features a perfectly balanced pilot control, capable of meeting any flow demands. Air and water cushioning assures feather touch operation. These valves are supplied in 3 inch to 36 inch sizes.

Make GOLDEN-ANDERSON your choice for every water control service. The line is *complete* . . . offers valves in sizes types to meet every requirement.

GOLDEN-ANDERSON VALVE SPECIALTY CO.

FULTON BLDG. • PITTSBURGH, PA.

POSTWAR PROJECTS (Cont'd.)

Tex., Harlingen—City, City Hall, pl... under way water imprvs. **$40,000.** Financ... not provided. A. Tamm, 107 S. 1 St., consul... engr.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Mo., Richmond Heights (St. Louis, P. O.)—City, B. W. LaTourette, mayor, C... Hall, defeated **$100,000** bonds, sewers a... rights-of-way. CD 4/25—ENR 5/3.

Tex., Houston—H. A. Kinney, Kurth Bldg., sewers in sub-division. Over $25,000. F... nancing provided.

Tex., Houston—Hill P. White & Hou... Realty Co., 3430 Leeland St., sewers for 12... acre sub-division. Over **$75,000.** Financi... not provided.

Wash., Walla Walla—City, City Hall sew... er mains, **$75,000.** Financing not provide...

PLANS UNDER WAY

Calif., Arcadia—City, City Hall, plan... under way sanitary sewerage sys., disposa... plant, 23 mi. sewer main, **$750,000** bon... voted. Koebig & Koebig, 458 S. Spring St... Los Angeles, consult, engrs. CD 3/30—EN... 4/19.

★**Calif., Oakland**—City, City Hall, plan... under way storm and sanitary sewer... **$5,311,000** bonds voted. W. N. Frickstad... City Hall, city engr. CD 3/22—ENR 4/5.

Mass., Pittsfield—City, Dpt. P. Wks., Ci... Hall, plans 50% completed brick, concre... disposal of refuse incinerator. **$100,00...** Financing not provided. Keis & Holroyd, 1... Broadway, Troy, N. Y., consult. engrs. C... 3/2—ENR 3/23.

★**O., Toledo**—City, City Hall, expan. sew... age treatment works in Bay View Park... Dist. **$1,000,000.** Jones & Henry, 2nd Na... tional Bank Bldg., consult. engrs. G. White... City Hall, city engr.

O., Toledo—City, City Hall, plans und... way incinerator plant, in West Toledo... **$250,000.** C. L. Piper, City Hall, city engr.

★**Ore., Medford**—City, City Hall, C. ... Meeker, mayor, plans completed sewa... disposal plant expan., **$231,000;** trunk sew... **$75,000;** storm sewer sys., **$482,000.** Cunning... ham & Associates, Spalding Bldg., Portland... consult. engrs. D. T. McDonough, City Hall... city engr. Bond election June 22. CD 4/... —ENR 5/3.

Tex., Baytown—Harris County Water Co... trol & Imprvt. Dist. 7, plans 25% complete... storm sewers, **$75,000;** sewage disposal plan... **$60,000,** sanitary sewer collection lines **$40,...000,** drainage sys. **$30,000.** Financing avai... able. J. J. Rady, Insurance Bldg., Fo... Worth, consult. engr. CD 2/13—ENR 3/8.

Tex., Galveston—City, City Hall, defeate... **$100,000** bonds sanitary sewer facilities (lim... ited). J. J. Rady, Insurance Bldg., Fo... Worth, consult. engr. CD 4/25—ENR 5...

Tex., Harlingen—City, H. Ramsey, mayo... City Hall, plans under way sanitary sewe... age sys. extens. **$100,000.** Financing not pro... vided. A. Tamm, 107 S. 1 St., consult engr... CD 8/28—ENR 9/7.

Tex., Harlingen — Town, H. Ramsey... mayor, City Hall, plans under way disposa... plant. **$75,000.** Financing not provided. A... Tamm, 107 S. 1 St., consult. engr.

Utah, Price—City, E. Leonard, engr., Cit... Hall, sewage disposal plant. **$65,000.** Fi... nancing not provided.

ADVANCED TO ACTIVE STATUS

Tex., Gonzales—City, City Hall, project... cancelled sewage disposal plant, pump. sta... tion, etc. **$60,000.** Work now going ahead... CD 3/30—ENR 4/19.

BRIDGES

PROPOSED WORK

★**N. Y., Atlantic Beach**—Nassau Co... Bridge Auth., Babylon, 6 lane draw spa... bridge replacing present Atlantic Beach... Bridge over Reynolds Channel, **$2,000,000.**

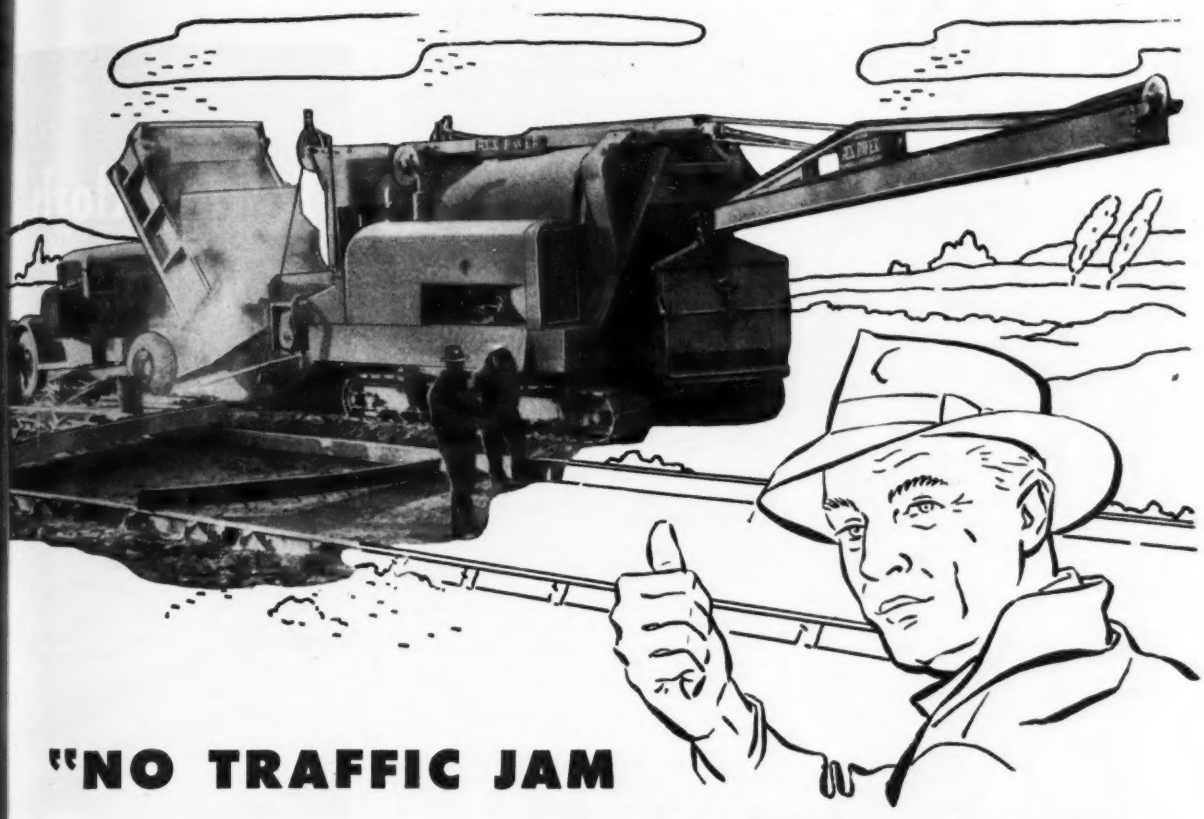
★**Rhode Island**—State Dpt. Roads &... Bridges, State House, Providence, rein... con., steel bridge, Newport-Jamestown, ove... **$1,000,000.** Financing not provided.

PLANS UNDER WAY

★**Connecticut**—State Hy. Dpt., W. J. Cu... comr., State Office Bldg., Hartford, bridg... over Connecticut River, between Old Say... brook and Old Lyme. To exceed **$1,000,00...** Financing not available. L. G. Sumner, Stat... Office Bldg., Hartford, engr.

★**Delaware**—State Hy. Dpt., Wilmington... plans under way Franklin Delano Roose... velt Memorial Bridge across Delaware Rive... near Wilmington. **$25,000,000** bonds vote... W. W. Mack, Wilmington, ch. engr.

★**N. Y., New York**—President Bronx Boro... 851 Grand Concourse, Zone 51, plan... under way grade crossing at Bruckner (East... ern) Blvd. and E. 141 St., Proj. PX-5... **$700,000,** grade separation at Bruckner... (Eastern) Blvd., Longwood and Lafayette... Aves. Proj. PX-53, **$800,000,** Corry & Zu...



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POSTWAR PROJECTS (Cont'd.)

muhler, 14 E. 47 St., New York, Zone 17, engr.; grade separation at Bruckner (Eastern) Blvd. and Bronx River Parkway Exten., Proj. PX-53, $600,000, T. T. Knapper, 132 E. 72 St., Zone 21, engr. Financing not provided.

O., Portsmouth—Bd. Comrs. Scioto Co., Portsmouth, plans under way replacing Dixon's Mill Bridge. $100,000. Financing not provided. W. O. Burch, Court House, acting co. engr.

Ore., Medford—City, C. A. Meeker, mayor, City Hall, plans under way Bear Creek bridge replacement. $35,000. Bond election June 22. D. T. McDonough, City Hall, city engr. CD 12/21—ENR 1/11.

STREETS AND ROADS

PROPOSED WORK

Mo., Richmond Heights (St. Louis, 17, P.O.)—City, B. W. LaTourette, mayor, City Hall, defeated $90,000 bonds, opening, widening, building streets. CD 4/25—ENR 5/3.

Tex., Houston — H. A. Kinney, Kurth Bldg., roads and developing grounds for subdivision. Over $50,000. Financing provided.

Wash., Walla Walla—City, City Hall, imprv. streets. $280,710. Financing not provided.

PLANS UNDER WAY

★**Ark., Little Rock**—City, D. T. Sprick, mayor, City Hall, resurfacing certain streets. $600,000. J. P. Power, City Hall, engr.

★**Calif., Oakland**—City, City Hall, plans underway street imprvs. $4,950,000 bonds voted. W. N. Frickstad, City Hall, city engr. CD 3/22—ENR 4/5.

★**†Idaho**—Pub. Roads Admin., Ogden, reconstructing U. S. Highway 10 between DeBorgia and St. Regis, Shoshone Co. $700,000. Financing not provided. B. J. Finch, Ogden, dist. engr.

Ill., Chicago—Cook Co. Hy. Dpt., G. Quinlan, supt., 160 N. LaSalle St., curbing, guttering, drainage, grading, paving Pratt Ave. $100,000, paving, realigning North Ave. $250,000. Financing not available. D. Campbell, ch. engr.

Mass., Quincy—City Highway Dpt., City Hall, private plans under way reconstructing various streets, $250,000. Financing provided.

★**N. Y., New York**—President Bronx Boro, 851 Grand Concourse, Zone 51, plans under way Boston Road imprv. from Cross Bronx Expressway to Mace Ave., Proj. PX54. $5,700,000. Financing not provided. Gilmore D. Clarke, M. Rapuano & L. G. Halloran, 10 Rockefeller Plaza, Zone 20, engrs.

★**N. Y., New York**—President Bronx Boro, 851 Grand Concourse, Zone 51, plans under way Boston Road imprv. from Mace Ave. to Bruckner Blvd. Exten., Proj. PX-54, $10,300,000. Financing not provided. Feld & Timoney, and Sanborn Fitzpatrick & Murphy, 103 Park Ave., New York, Zone 17, engrs.

★**Tex., Galveston**—City, City Hall, defeated $1,000,000 bonds street and highway imprvs. inside city limits. J. J. Rady, Insurance Bldg., Fort Worth, consult. engr. CD 4/23—ENR 5/3.

Ont., London—City Council, City Hall, widening 2 mi. York and Stanley Sts. making new highway for through traffic with boulevard through Fair Grounds. $150,000-$200,000. Wm. Veitch, City Hall, engr.

EARTHWORK, WATERWAYS

PROPOSED WORK

Mo., Richmond Heights (St. Louis, 17, P.O.)—City, B. W. LaTourette, mayor, City Hall, defeated $75,000 bonds, altering channels of water courses and bldg., repairing bridges and culverts and right-of-way. CD 4/25—ENR 5/3.

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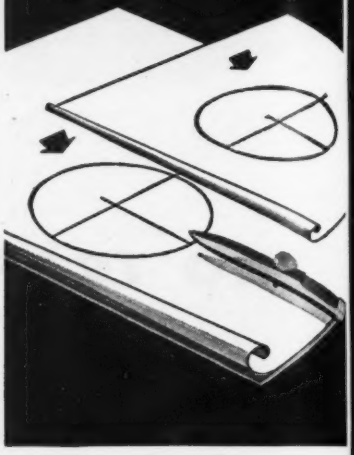

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The strictest kind of fire regulations and safety laws will not prevent all fires. There still will be spontaneous combustion, explosions, lightning, and other unpredictable causes to start fires. Since "an ounce of prevention is worth a pound of cure", the best kind of fire insurance for your city is MUELLER-COLUMBIAN Improved Fire Hydrants. When a fire does break out a quick response by your firemen is important. If time is lost trying to untangle snarled cap chains or yank open a cranky hydrant, a terrible conflagration can develop from what should have been a minor blaze.

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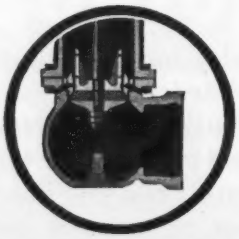

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POSTWAR PROJECTS (Cont'd.)

†**Wash., Colfax**—U. S. Eng., 628 Pi... Blk., S.W. 10 Ave. and Washington St., P... land 5, Ore., channel imprvs. on Pa... River and Spring Flat Creek, $81... Financing not provided.

PLANS UNDER WAY

★**Tex., Galveston**—City of Galveston ... Galveston County Drainage Dist., Ga... ton, defeated $2,800,000 bonds, drain... Ford, Bacon & Davis, 39 Bway., New Y... N. Y., and Texas City, consult. engrs. C... Washington, Courthouse, co. engr. CD ... —ENR 5/3.

LATIN AMERICA

Panama, Panama City—Hoteles Interam... icas, S. A., Panama City, plans under ... 500 room hotel near government airp... $5,000,000.

PUBLIC BUILDINGS

PROPOSED WORK

★**Ill., East St. Louis**—St. Clair Co... Housing Auth., N. Ralph Huff, exec. ... 6 St. and Ohio Ave., housing, providing ... ing quarters for 1,400 families. $8,000,000

Ill., Rantoul—Rantoul Twp. High Sch... Dist., c/o Secy., approved bond issue, re... con., brick, stone high school addn. $247,...

Me., Lewiston—City, Mayors' Office, 2 ... school addns. To exceed $150,000.

Me., Lewiston—City, Mayors' Office, ... Hall, school at Franklin Pasture. To exc... $150,000.

★**Md., Baltimore**—Housing Auth. of Ba... more, 719 Eager St., 3 year slum cle... ance program, 7,400 dwelling units proba... and 2 stories, bamnt., brick, frame constr... tion, $42,750,000. Applied for Governm... loan.

Mass., Springfield—City Welfare D... City Hall, city home. To exceed $150,000

Mass., Upton—Town, M. C. Temple, ... Bldg. Comn., Glen View St., Milford, h... school. To exceed $150,000. Financing ... provided.

Mo., Richmond Heights (St. Louis, ... P. O.)—City, B. W. LaTourette, mayor, ... Hall, defeated bonds, library and site, $... 000; bldg. for city automobiles, trucks, ... $25,000. CD 8/11—ENR 9/7.

O., Toledo—Bd. Comrs. Lucas Co., ... Municipal Hospital Bd., City Bldg., Dr. ... Hartung, comr. Health, 50-bed contag... hospital unit. $200,000-$250,000.

★**Ore., Portland**—Portland Housing Au... Portland, 3,350 low rent housing un... $7,000,000. Financing not provided.

Tex., Galveston—City, City Hall, defea... $150,000 bonds, fire dpt. bldg., imprvs. ... 4/23—ENR 5/3.

Tex., Houston—Houston Housing Au... San Felipe Courts, Houston, 300 unit ho... ing project. $1,000,000. Financing not p... vided.

Wash., Everett—Everett Housing Au... Everett, 200 housing units, $400,000. Finan... ing not provided.

Wash., Port Angeles—Clallam Co. Hous... Auth., Port Angeles, 200 low-rent hous... units, $400,000. Financing not provided.

★**Wash., Seattle**—Seattle Housing Au... 825 Yesler Way, Zone 4, 2,000 low-r... housing units. $4,000,000. Financing not p... vided.

Wash., Sunnyside — Sunnyside Housi... Auth., Sunnyside, 40 low rent housing uni... $150,000. Financing not provided.

Wash, Walla Walla — City, City Ha... street and sanitary storage bldg., ... $160,000. Financing not provided.

Man., Neepawa—Neepawa Hospital Bo... Neepewa, 50-bed hospital, about $175,000.

★**Ont., Sudbury**—Sudbury High Sch... Bd., J. G. Lowe, secy., 15 Elm St., ... high school. About $750,000.

Sask., North Battleford—Municipality, c... hall, $150,000.

PLANS UNDER WAY

Calif., Berkeley—City, plans by J. ... Plachek, Mercantile Bldg., and B. Re... Hardman, 2068 Allston Way, remodeling c... hall, $350,000-$400,000. Financing not p... vided. CD 3/23—ENR 3/28.

Calif., El Segundo—City, City Hall, pla... by J. C. Austin, 1151 S. Bway, Los Angel... city hall, $150,000.

★**Calif., Oakland**—City, City Hall, pla... under way, hall of justice and police ad... ministration bldg., $2,707,000; main libra... and 4 branch libraries, $1,763,500. Bon... voted. W. N. Frickstad, City Hall, c... engr. CD 3/22—ENR 4/5.

★**Calif., Petaluma**—City, City Hall, pla... by J. Clarence Felciano, 4010 Monte... Ave., Santa Rosa, purchase site, $160,0... construct 2 story city hall, $200,000; 1 sto... auditorium and recreational bldg., ... equip., $220,000. Bond election June 12.

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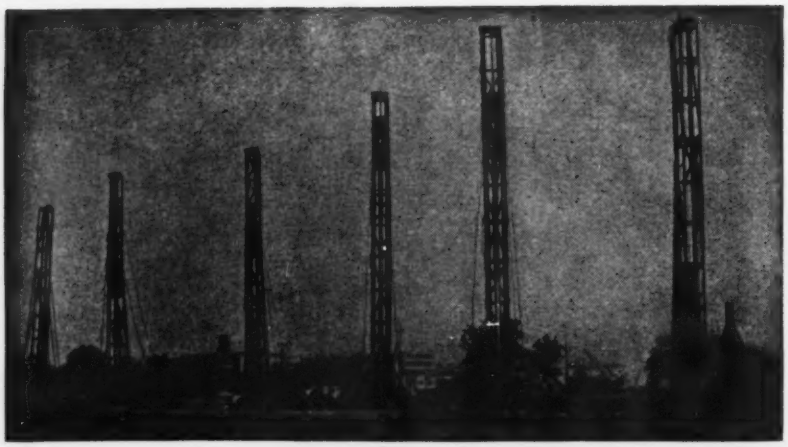

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POSTWAR PROJECTS (Cont'd.)

★**Calif., Stockton**—Stockton Unified Sch Dist., San Joaquin and Lindsay S plans by J. Losekann, 311 E. Market S Franklin Junior High School plant, conta ing approx. 24 classrooms, boys gym., gi gym., auditorium, swimming pool, ca teria, library, study hall, domestic scie wing. **$950,000.** Financing not provide CD 2/8—ENR 2/22.

Conn., Southington — Town, Wm. Strong, supt. Schools, Town Hall, plans E. Sibley, 83 Wall St., Norwalk, brick, st high school, **$150,000.** Financing not pr vided. CD 11/5/43—ENR 11/11/43.

★**Idaho, Lewiston** — Independent Sch Dist. 1, Lewiston, plans by Whitehouse Price, Hutton Bldg., Spokane, Wash., schools and vocational arts bldg. $719,0 Financing provided. CD 4/27.

Me., Calais—City, E. A. Woodman, mayo City Hall, sketches by A. J. Harriman, Shepley St., Auburn, 2 story, bsmnt., classroom high school, auditorium and gy nasium, **$200,000.** Financing not provide CD 11/9—ENR 11/30.

★**Mass., Chelsea (br. Boston)**—Commo wealth of Massachusetts, L. F. Quigle commandant, Soldiers Home, Crest Av plans 50% completed by Perry, Shaw Hepburn, Park Sq., Boston, hospital add **$750,000.** CD 5/22/44—ENR 5/25/44.

Mass., Danvers—Commonwealth of Mass chusetts, Dpt. Mental Health, 100 Nash St., Boston, plans completed by M. A. Dy Co., 8 Beacon St., Boston, 2 story, bsmt 60 x 100 ft., brick, steel laundry addn., PW 44, **$90,000.** Financing not provided. Hayd Harding & Buchanan, Park Square Bldg Boston, consult. engrs.

Mass., Ludlow—Town, Bd. Selectme Town Hall, sketches by P. B. Johnson, Vernon St., Springfield, 2 story, bsmnt., brick steel high school addn., **$150,000.** Financi not provided. CD 3/14—ENR 4/5.

Mass., Springfield—City Planning Bd Springfield, preliminary survey by L. C Hincley, 25 Harrison Ave., determin municipal bldgs. required. Over $150,0 Financing not provided.

★**N. Y., New York**—Bd. Educ., 49 Flatbu Ave. exten., Brooklyn, Zone 1, plans com pleted 4 story, bsmnt. P.S. 86, 340 E. 83 St corner First Ave., **$1,125,000.** Financing n provided. E. Kebbon, c/o owner, engr. C 1/13—ENR 1/27.

N. Y., New York—Dpt. P. Wks., Municip Bldg., Zone 7, plans by Magoon & Salo, Madison Ave., Zone 17, Riverside Heal Substation, 129 St. and Old Bway., Pro HL-48, for Dpt. Health, 125 Worth St., Zon 13, **$130,000.** Financing not provided. C 1/21/44—ENR 2/10/44.

★**N. Y., New York**—Dpt. P. Wks., Munic pal Bldg., New York, Zone 7, plans b Louis Allen Abramson, 25 W. 45 St., Zone Crow, Lewis & Wick, 200 5 Ave., Zone and Electus D. Litchfield, 1841 Bway., Zon 23, assoc. archts., patients pavilions an related spaces and services, alterations, re constructions, at Bellevue Hospital, Pro HO-145, for Dpt. Hospitals, 125 Worth St Zone 13, **$12,400,000.** Financing not provided

★**O., Akron** — City, City Hall, 6 story bsmnt., 90x125 ft. police station, **$787,000** Legal obstacles to be overcome, financing n provided. L. B. Hiebel, Municipal Bldg. city engr.

★**O., Cincinnati**—University of Cincinnati R. H. Walters, pres., Clifton Ave., pre liminary plans by H. Hake, 2400 Gilbert Ave 3 story, bsmnt., 62 x 380 ft., brick, steel concrete McMicken Hall, **$1,000,000.** Financing provided. CD 1/31—ENR 2/22.

O., Columbus—Bd. Comrs. Franklin Co. Court House, plans by Sims Cornelius & Assoc., 2901 N. High St., 3 story, bsmnt., 45x100 ft., brick, stone Franklin County Home Hospital, **$163,000.** Bond election in November.

O., Franklin—Village, J. T. Riley, mayor, Village Hall, plans by Grunkemeyer & Sullivan, 3717 Eastern Ave., Cincinnati, com munity center memorial bldg. **$250,000.** Legal obstacles to be overcome, and financing not provided.

O., Gahanna—Jefferson Twp. Bd. Educ. B. A. Woodruff, clk., Gahanna, plans by J. Quincy Adams, 33 S. Champion Ave., Columbus, 8 room brick, stone school. **$200,000.**

O., Grove City—Franklin Twp. School Dist., Sara Ely, clk., Grove City, plans by Walker, Norwich & Templin, American Bldg., Dayton, brick, steel school addn., **$278,000.** CD 5/2—ENR 5/17.

O., Perrysburg — Bd. Educ., Perrysburg Village School Dist., plans 10% complete by Britsch & Munger, Nicholas Bldg., Toledo, remodeling high school, construct school. **$385,000.** Bond issue approved. CD 9/14—ENR 10/5.

O., Toledo—Bd. Comrs. Lucas Co., Court House, plans completed, completing wing at Roche Hospital, **$395,200.** Legal obstacles to be overcome, financing not provided. C. Hatch, City-County Planning Comn., Court House, Zone 2, engr.

O., Washington Court House—Bd. Comrs. Fayette Co., Washington Court House, preliminary plans completed by Samuel Hannaford & Sons, Dixie Terminal Bldg., Cincinnati, 55-bed hospital. **$328,000.** Financing not provided.

Lithographed on stone by Edward A. Wilson

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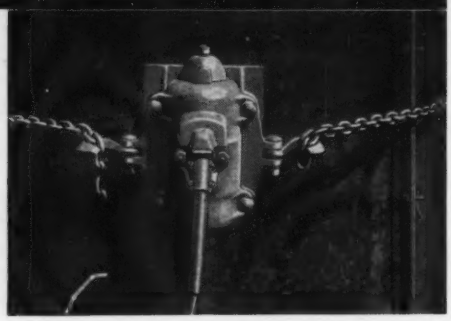

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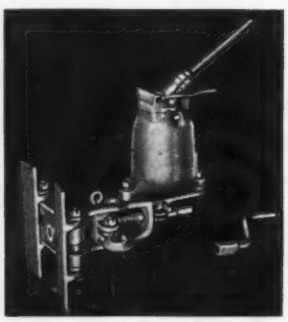

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POSTWAR PROJECTS (Cont'd.)

Tex., Dallas—Bd. Educ., J. Dorsey, supt., plans 15% completed by Gleb & Lanum, Texas Bank Bldg., auditorium and school unit. **$150,000.** Financing provided.

Tex., Katy—Katy Ind. School Dist., Katy, plans 75% completed by E. S. White, 1648 Castle Ct., Houston, school, **$250,000** bonds voted.

Wash., Kelso—School Bd., Kelso, plans by E. N. Dugan, Rust Bldg., Tacoma. Senior High School **$250,000**; school, **$175,000**; school addn., **$65,000.** Financing not provided. CD 12/14—ENR 12/28.

Wash., Spokane—City, City Hall, civic auditorium. Over **$150,000.** Financing partially available. E. S. Butler, City Hall, city engr.

ADVANCED TO ACTIVE STATUS

★ **Minn., Faribault**—State Dpt. Admin., M. S. Cooper, dir. Purchases 19 State Capitol, St. Paul, project cancelled, four 2 and 3 story brick, hollow tile dormitories at School for Feeble Minded. **$377,000.** Work now going ahead. CD 4/14/43—ENR 4/22/43.

COMMERCIAL BUILDINGS

PROPOSED WORK

★ **Ark., Hot Springs**—Southwest Hotels, Inc., Hotel Marion, Little Rock, 400-room hotel. Over **$500,000.**

Ark., Little Rock—Southwest Hotels, Inc., Hotel Marion, remodeling Hotel Marion. **$375,000.**

Conn., Bristol—Calvary Temple, Rev. G. W. Stanley, Cooke St., Plainville, stone church superstructure, Lewis St. **$150,000.** Financing not provided. Contract for bsmnt., awarded to E. S. Edman, 78 Henderson St.

Ind., Winona Lake—Grace Theological Seminary, Winona Lake, brick, steel building housing office, chapel, classrooms and library. **$150,000.** Site purchased. Financing not provided.

Mass., Fitchburg—St. Anthony's Church, Rev. A. Carpinella, 2 Beekman St., parochial grade school. To exceed **$150,000.**

Mass., Pittsfield—Second Congregational Church, Rev. H. L. Nevers, pastor, Pittsfield, church. To exceed **$150,000.**

★ **Mo., St. Louis**—DuVoll Corp., C. F. Drozda, pres., 4006 Chouteau Ave., Zone 10, plans 8 story, 120-suite L-shaped apartment, with underground garage and court in rear, on 360 ft. x 375 ft. site, Magnolia and Tower Grove Aves. Approx. **$950,000.** CD 10/5—ENR 10/19.

★ **O., Dayton**—Bd. Trustees St. Elizabeth Hospital, M. C. Kuntz, chn., 49 Hopeland Ave., brick, steel, concrete hospital bldg. **$1,110,000.** Financing not provided.

★ **O., Toledo**—Sisters of Notre Dame, 1111 W. Bancroft St., school and provincial house at Secor Rd. and Monroe St., and enlarging Notre Dame Academy, Bancroft and Monroe Cts. **$500,000** or more.

Pa., Phila.—F. B. Storch, 4409 Princeton Ave., dwellings. **$200,000.**

Pa., Phila.—T. F. Ziegler, c/o Sherman & Sherman, Ogontz and Champlost Sts., dwellings on recently purchased 92 lots on Ogontz Ave. between 65 and 66 Aves. **$360,000.**

S. C., Columbia—Epworth Orphanage, Dr. W. D. Roberts, supt., c/o Methodist Churches of South Carolina, Millwood Ave., remodel, renovate bldgs., construct chapel, boys home, etc. **$400,000.** Financing not provided.

Tex., Houston—W. L. Moody, Jr. & Interests, 2028 Market St., Galveston, hotel and stores bldg., **$1,000,000** or more. Financing provided.

★ **Tex., Houston**—Rice Institute, Main St., library bld. **$1,000,000.** Financing provided.

PLANS UNDER WAY

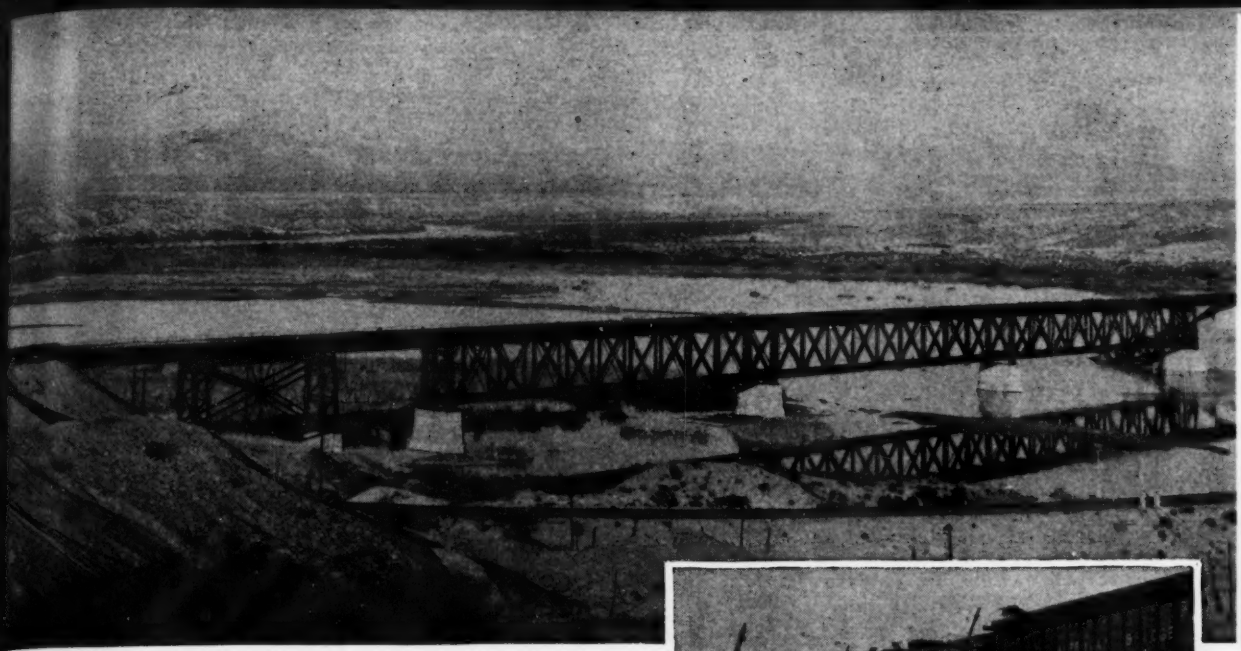
★ **Calif., Los Angeles**—Kaiser Community Homes, F. B. Burns, pres. and mgr., 6060 W. Manchester Ave., plans 80% completed several hundred 5 and 6 room dwellings here and in vicinity. **$5,000,000.**

★ **Conn., Wallingford**—Gaylord Farm Sanatorium, F. C. Walcott, genl. chn. Financial Com., Norfolk, plans by D. Orr, 96 Grove St., New Haven, brick, steel tuberculosis sanatorium, 5 treatment cottages and 2 staff residences, infirmary. **$600,000.** Financing not provided. CD 5/9—ENR 5/17.

Minn., Northfield—St. Olaf College, Northfield, plans by Lang & Raugland, 502 Wesley Temple Bldg., Minneapolis, power plant imprvs., furnishing, installing new 600 hp. boiler, new 500 kw. generator, water softening equip., etc., some bldg. alterations. **$85,000.** G. M. Orr Engrg. Co., 1004 Marquette Ave., Minneapolis, consult. engr. CD 9/20—ENR 10/5.

Minn., Richmond—Sts. Peter and Paul Roman Catholic Church, Rev. Ansgar Osendorf, OSB, pastor, plans by F. W. Jackson, St. Cloud, high school. **$150,000.**

O., Columbus—Boulevard Presbyterian Church, 1235 Northwest Blvd., plans by R. Orr, 265 Oakland Park Ave., church. **$150,000-$200,000.** Legal obstacles to be overcome, financing not provided.



TA FE's new, high-level Topock Bridge replaces an old through-truss cantilever crossing
e Colorado River. The old bridge (not shown) is located at the extreme right end of the
ing alignment of the low-level roadbed in the foreground. The new, ballasted-deck struc-
consists of three, 350-foot deck truss spans over the main channel with plate girder
roaches to the east and west, respectively 150 and 300 feet long. The steel superstructure
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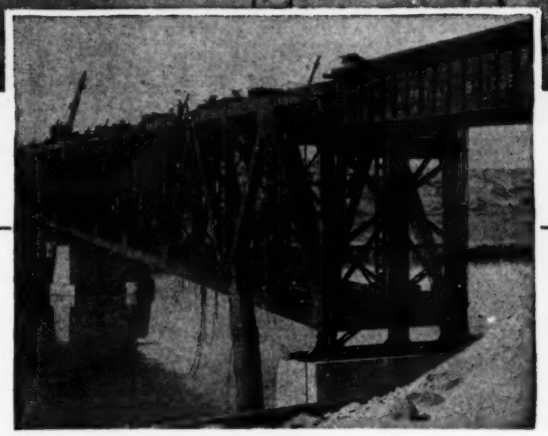

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The new Topock Bridge eliminates the "bottleneck." Its design and construction embody engineering developments that contribute to permanence and to the strength and ruggedness necessary to meet today's and tomorrow's heavy power, traffic density and high speed operations. It is the major element of a greatly improved roadbed alignment which reduces by some 327 degrees in central angle the amount of total curvature inherent in the older line.

The developments and accomplishments of wartime "railroading" will be influencing factors of postwar competition. And transportation projects such as this Topock Bridge point the way to the coming job of roadbed rehabilitation. When the railroads' postwar jobs shape up, American Bridge will be prepared with vastly greater resources and experience, to meet their every structural need.

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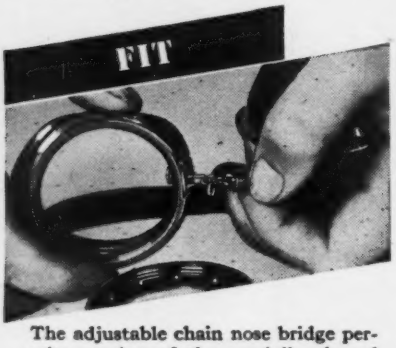

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POSTWAR PROJECTS (Cont'd.)

O., Toledo—Catholic Diocese of Toledo, C. J. Alter, bishop, 2544 Parkwood Ave., plans completed by Wm. Richard Perry, 2882 W. Liberty Ave., Pittsburgh, Pa., 4 story, brick wing Central Catholic High School, Cherry St. **$300,000** or more. Financing not provided.

★**R. I., Woonsocket**—Woonsocket Hospital Corp., 115 Case Ave., plans by Curtin & Riley, 45 Newbury St., Boston, Mass., brick, steel addnl. hospital bldgs. **$500,000.** Financing not provided. CD 12/8—ENR 12/28.

S. C., Greenville—Furman University, c/o Chn. Bd., Greenville, plans by J. E. Sirrine & Co., Greenville, bldgs. **$300,000.**

★**Tex., Goose Creek**—San Jacinto Memorial Hospital, c/o J. M. Kilgore, chn., Goose Creek, plans 10% completed by K. Franzheim, 2306 Crawford St., Houston, and L. Lammers, assoc. archt., Baytown, memorial hospital, etc. Over **$500,000.** Financing provided. CD 1/5—ENR 1/25.

★**Tex., Houston**—Hill P. White & Associates, 3430 Leeland St., plans 75% completed 500 dwellings on 140 acre tract adjacent Highland addn., **$2,500,000;** plans 50% completed 315 dwellings on 75-acre site off Telephone Rd. **$1,900,000.** Financing provided.

Wash., Seattle—Seattle Post 1, American Legion, 4th and Pike Bldg., Zone 1, plans completed by W. J. Bain & Associates, Smith Tower, 2 Ave. and Yesler Way, Zone 4, altering Old Labor Temple for clubrooms, 6 Ave. and University St. **$200,000.** Financing not provided. CD 4/13—ENR 5/3.

Wis., Neenah—1st Presbyterian Cong., 214 Church St., plans by Magney, Tusler & Setter, 202 Foshay Tower, Minneapolis, Minn., church addn. **$225,000.**

READY FOR BIDS

★**N. Y., New York**—Chalfonte Syndicate, Inc., E. M. Cohan, pres., c/o S. Bien, archt., 9 E. 46 St., Zone 17, plans completed 28 story apartment, 2-8 5 Ave. and 14-16 Washington Sq. N. **$2,800,000.** Financing available.

CONTRACTS AWARDED

★**N. Y., Ithaca**—Cornell University, Ithaca, women's dormitory housing 425 students, to Barr & Lane, Inc., 420 Lexington Ave., New York, Zone 17, Est. **$800,000.** Bagg & Newkirk, U. G. & E. Bldg., archts.

PROJECTS CANCELLED

Mass., Winchester—Winchester Hospital, Highland Ave. will not build brick, steel hospital addn. **$150,000.** Project abandoned. Kendall, Taylor & Co., Inc., 221 Columbus Ave., Boston, archts. CD 3/20—ENR 4/6.

ADVANCED TO ACTIVE STATUS

Conn., Bridgeport — Hungarian Reformed Church, 641 Hancock Ave., project cancelled, 1 story church, 2 story, bsmnt., school and parish house. **$200,000.** Work now going ahead. CD 6/29—ENR 7/13.

R. I., Warwick—American Home Builders, 74 Brookside Dr., Cranston, project cancelled 100 unit post war homes, West Shore Rd. Work now going ahead. CD 4/4—ENR 4/19.

INDUSTRIAL BUILDINGS

PROPOSED WORK

★**Calif., Berkeley**—CREAMERY, etc.—Challenge Cream & Butter Assn., 896 22 St., large creamery and cheese mfg. plant, **$500,000.** Financing not provided.

★**Ind., Anderson** — PLANT — Guide Lamp Corp., Div. General Motors Corp., 25 and Arrow Sts., 300x800 ft., brick, steel plant bldg. **$500,000** or more with equip.

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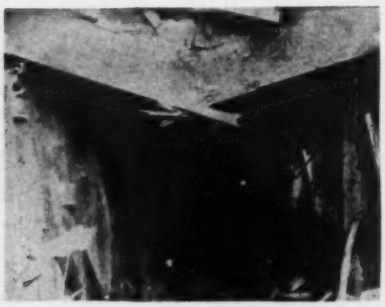

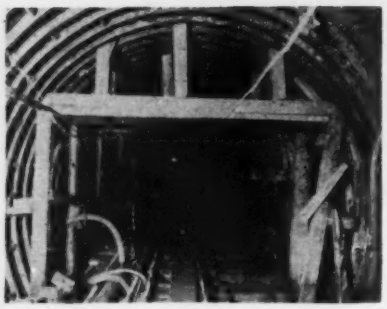

Here a tremendous weight of disintegrated rock caused failure in a heavily timbered pioneer bore. The result was as seen in the first illustration. To correct this the bore was lined with COMMERCIAL Steel Liners and Ribs. Inspections, made over a period of several months, showed that COMMERCIAL Steel Liners and Ribs had *stopped all ground movement.*

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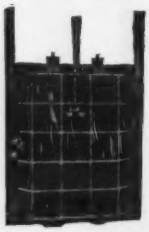

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POSTWAR PROJECTS (Cont'd.)

Ind., Muncie — PLANT BLDG. — Delco Remy Div. General Motors Corp., 2501 Columbus Ave., Anderson, office bldg., at Muncy Battery Plant, **$80,000** or more.

★**Ind., South Bend**—PLANT—Studebaker Corp., South Bend, 2 bldgs., remodeling 1 bldg. consisting 2 story, L-shaped 100 x 635 ft. and 125 x 125 ft. rein.-con., main bldg. west of present administration bldg.; rebuilding 80 x 500 ft. loading dock. **$2,500,000.**

Ia., Clinton—PLANT—E. I. duPont de Nemours & Co., duPont Bldg., Wilmington, Del., cellophane plant.

★**Mo., St. Louis** — FACTORY — Hussman-Ligonier Co., W. B. McMillan, pres., 2401 N. Leffingwell Ave., Zone 6, 1 story, brick, steel factory, Glasgow Ave. and Benton St. Approx. **$500,000.** Site purchased.

O., Columbus—PACKING PLANT—Columbus Packing Co., Div. Armour Co., M. Keller, in charge, 1981 S. High St., 3 story, packing plant addn., imprvs. **$175,000.**

Pa., Warren—PLANT—Air Reduction Sales Co., 60 E. 42 St., New York, N. Y., plant, Morrison and Sechrist Sts. To exceed **$40,000.** Site acquired.

Tex., Houston—WAREHOUSE—J. Heffernan, Jr., 3252 Charleston St., warehouse, storage and materials yard, etc. Over **$75,000.** Financing provided.

Tex., Houston—PLANT, etc.—Houston Pump Service Co., 3702 Polk St., reconstructing plant and warehouse. Over **$40,000.** Site purchased. Financing provided.

Wash., Seattle — WAREHOUSE, etc. — Goodwill Industries, 1400 Lane St., Zone 8, warehouse and salvage bldg., replacing structure destroyed by fire. **$200,000.** Financing partially available.

Ont., Toronto—PLANT—Canadian Mexican Chemical Industries, Ltd., c/o J. G. Fester, 261 High Park, plant. Over **$50,000.**

PLANS UNDER WAY

Mich., Grand Rapids—FACTORY—J. C. Miller Co., 55 Mt. Vernon St., making plans, 1 story, 33x260 ft. brick, steel, concrete factory. **$50,000.** Financing available.

O., Archbold — WAREHOUSE — LaChoy Food Products Co., Div. Beatrice Creamery Co., F. Jenkins, mgr., Archibold, plans under way warehouse addn. **$65,000.**

Tex., Houston—STORAGE—Hovas Furniture Co., 7800 Blk. Harrisburg Blvd., plans by D. V. James, So. Standard Bldg., 100x147 ft., hollow tile, concrete storage and display bldg. **$55,000.** Financing provided.

READY FOR BIDS

N. Y., New York—PLANT—International Tailoring Co., 4 Ave. and 12 St., Zone 3, plans completed by Starrett & Van Vleck, 267 5th Ave., Zone 16, 10 story addn. to 13 story bldg., 4 Ave. and 12 St. **$200,000.** Financing provided.

N. Y., New York—FACTORY—Penn Bros. Realty Corp., 420 Manida St., plans completed by J. Eckmann, 17 E. 42 St., Zone 17, 2 story factory, Manida St. near Oak Point Ave. **$56,000.** Financing provided.

Pa., Corry—PLANT—Raymond Mfg. Co., Div. Associated Spring Corp., Corry, plans completed First Ward Plant addn. **$300,000.**

Tex., San Antonio — WAREHOUSE and PLANT — Carpenter Paper Co., 619 W. Commerce St., plans completed by A. B. & R. M. Ayres, Transit Tower Bldg., brick, concrete warehouse and plant bldg. **$100,000.** Financing provided. CD 12/28—ENR 1/11.

Ready for Bids

Of $17,000,000,000 of proposed postwar construction at beginning of 1945 only $550,000,000 was reported "ready for bids", plans complete and financing available.

If you have projects "ready for bids", please send them in to be added to the total above to give a measure of the materials that will be needed to relax restrictions and go ahead with civilian work.

Send ready - for - bids projects news to Elsie Eaves, Manager Business News Department, Engineering News - Record, 330 W. 42 St., New York 18 N. Y.

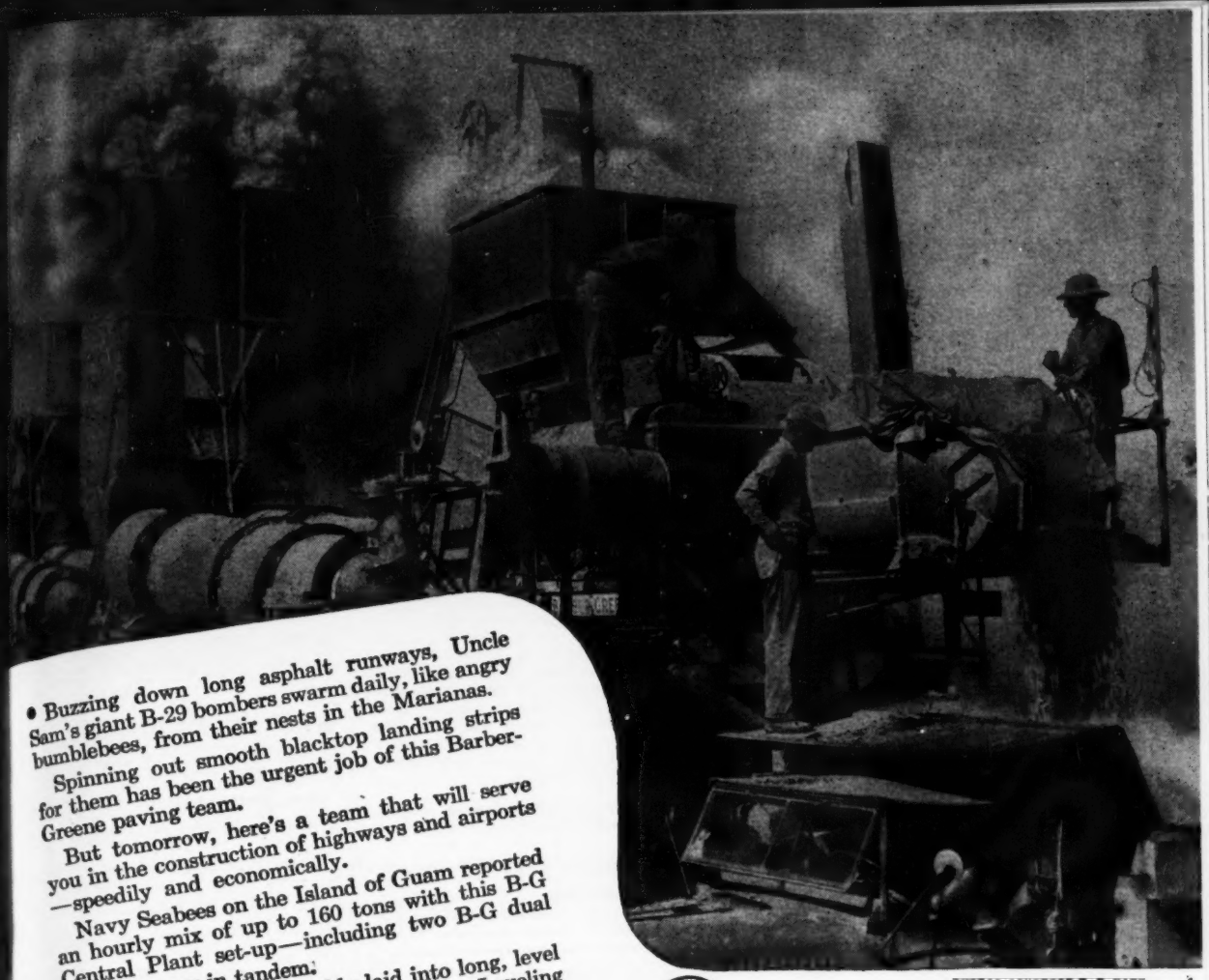
CONTRACTS AWARDED

Ark., Conway—POWER PLANT IMPROVEMENTS—Conway Corp., F. Gordy, bus. mgr., Conway, installing 1,240 hp. diesel engine in power plant, to Fulton Iron Works, 1259 Delaware St., St. Louis, Mo., **$69,666.** CD 7/19—ENR 8/10.

UNCLASSIFIED

PROPOSED WORK

Fla., Miami—BROADCASTING STATION—A Frank Katzentine, 1759 N. Bay Rd., Miami Beach, FM broadcasting station. Over **$25,000.**



PHOTOS COURTESY U. S. NAVY

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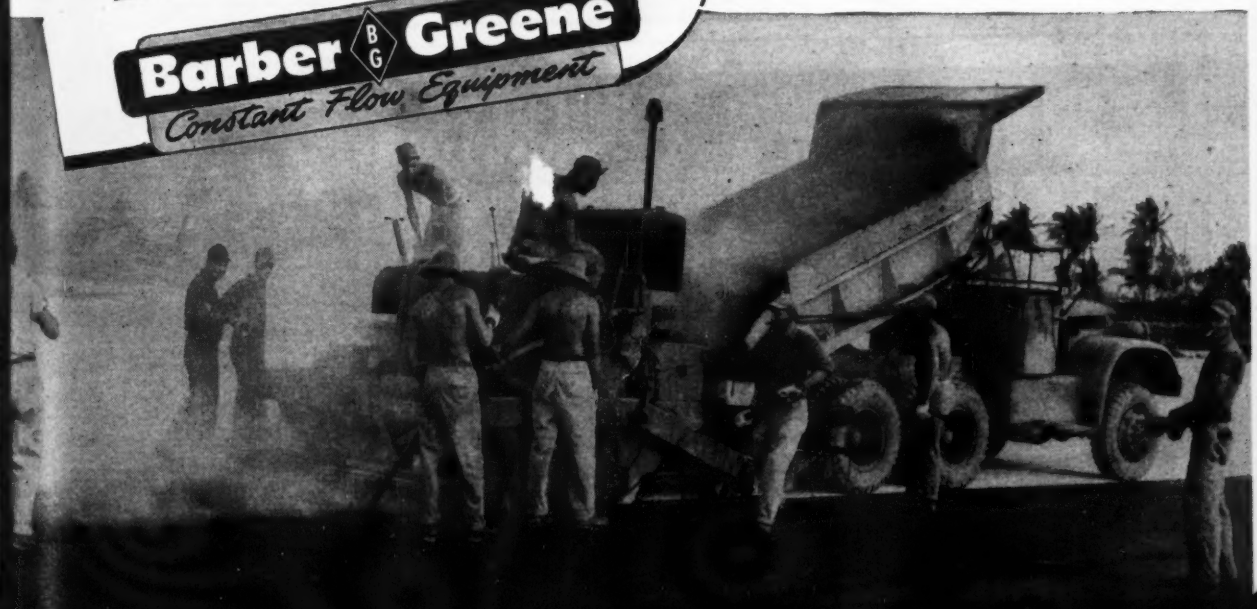

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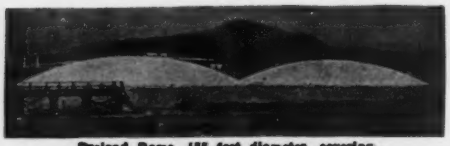

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POSTWAR PROJECTS (Cont'd.)

Ga., Atlanta—BROADCASTING STATION—Liberty Broadcasting Corp., 56 Marietta St. N.W., FM broadcasting station. $125,000.

★**Mo., Liberty**—TRANSMITTER, etc.—KCMB Broadcasting Co., T. L. Evans, pres., Commerce Bldg., 50,000 watt transmitter, incl. 5 steel towers, offices, studio near here, Clay Co. **$500,000.**

Mo., Richmond Heights (St. Louis, 17, P.O.)—PARK, etc.—City, B. W. LaTourrette, mayor, City Hall, defeated **$400,000** bonds, park with swimming pool, other recreational facilities. CD 4/25—ENR 5/3.

Ore., Portland—BROADCASTING STATION—Pacific Radio Advertising Service, 613 Southwest Alder St., FM broadcasting station. Over **$25,000.**

Tex., Dallas—APRONS—City, City Hall, addnl. rein.-con aprons, at Love Field, for various airlines usage. **$100,000.** Financing not provided.

Tex., Houston—GROUNDS DEVELOPMENT—Hill P. White & Houck Realty Co., 3430 Leeland St., development of grounds for 350-acre subdivision. Over $25,000. Financing not provided.

Wash., Seattle—BROADCASTING STATION—Queen City Broadcasting Co., Inc., 66 Cabb Bldg., FM broadcasting station. **$135,000.**

Wash., Walla Walla—POLICE and FIRE ALARM SYSTEM, etc.—City, City Hall, police and fire alarm sys., **$61,325**; park and recreation imprvs., **$10,000.** Financing not provided.

PLANS UNDER WAY

★**Calif., Oakland**—SWIMMING POOLS, etc.—City, City Hall, plans under way, swimming pools, **$600,000**; other recreational projects in East Oakland, **$423,000.** Bonds voted. W. N. Frickstad, City Hall, city engr. CD 3/22—ENR 4/5.

★**Calif., Los Angeles**—AIRPORT—City, City Hall, voted **$12,500,000** bonds, construction at municipal airport, near Inglewood, O. W. Ott & C. T. Gibbs, Washington Bldg., consult. engrs. L. Aldrich, City Hall, city engr. CD 1/15—ENR 1/25.

Mass., Medford—FIRE ALARM SYSTEM—City, Fire Dpt., Medford, plans by M. A. Dyer Co., 8 Beacon St., Boston, central fire alarm sys. **$150,000.** Financing not provided.

N. Y., New York—ICE SKATING RINK, etc.—Dpt. Parks, Arsenal Bldg., 64 St. and 5 Ave., plans completed outdoor ice skating rink, lunchroom and observation terrace near zoo area in Central Park. $300,000. Financing not provided. Aymar Embury II, 150 E. 61 St., Zone 21, archt. CD 3/6/44—ENR 3/23/44.

★**N. Y., St. George**—FERRY TERMINAL, etc.—Dpt. Marine & Aviation, Pier A, North River and President Richmond Boro, St. George, plans under way reconstructing St. George Ferry Terminal and approaches, Proj. D-179. **$7,425,000.** Financing not provided. Madigan & Hyland, 38-04 41 Ave., Long Island City, and Fay Spofford & Thorndike, 120 Lexington Ave., New York, Zone 17, engrs.

O., Lakeside—BATHING BEACH, etc.—The Lakeside Foundation, P. J. Slach, pres., 5642 Broadway, Cleveland, plans under way bathing beach, facilities, repaving various streets, enlarging water filtration plant, **$210,000.** Land rights not cleared, legal obstacles to be overcome. G. E. Scott, Citizens Bank Bldg., Norwalk, archt. A. L. Hoover, Lakeside, gen. mgr. and chn. Building Com.

O., Toledo—CEMETERY IMPROVEMENTS—City, J. H. Jewhurst, service dir., City Hall, imprv. Forest Cemetery, incl. drainage sys., **$71,000**; drives, **$75,000**; administration bldg. and superintendent's residence, $15,000. C. Hatch, Court House, Zone 2, engr.

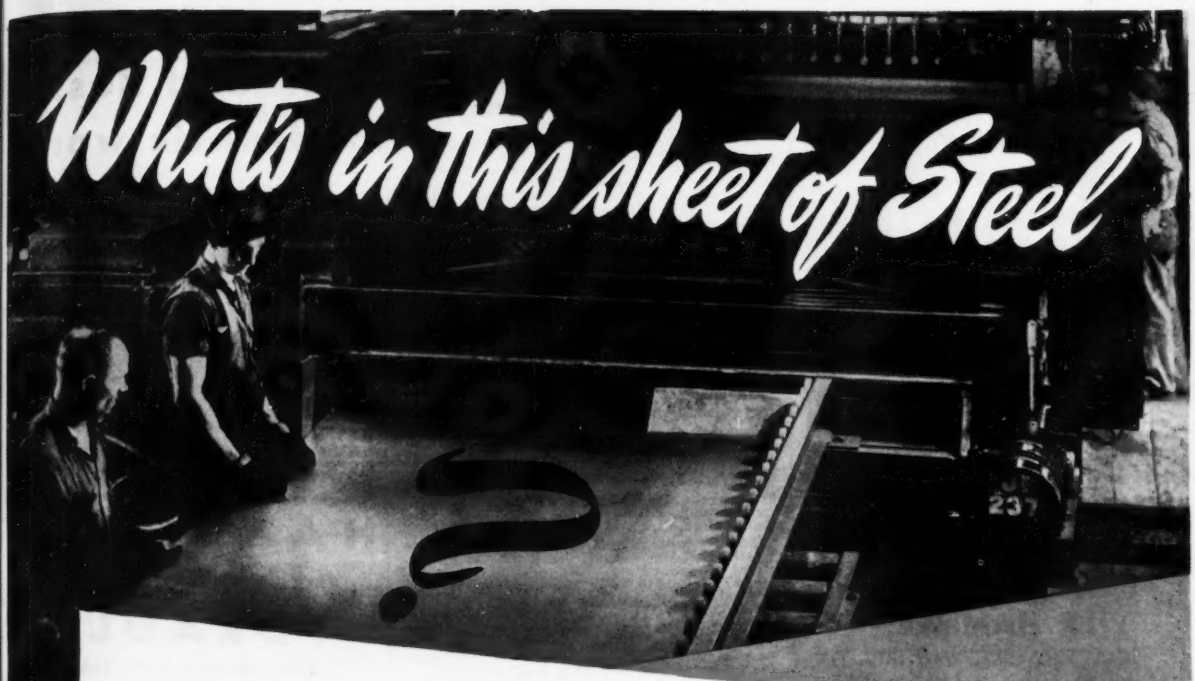
O., Toledo—PARK FAIRWAYS WATERING SYSTEM—City, City Hall, watering sys. for fairways at Ottawa Park and Bayview Park Golf Courses, **$132,500.** C. Hatch, City-County Plan Comn., Court House, Zone 2, engr.

★**O., Toledo**—SWIMMING POOLS, etc.—City, J. H. Jewhurst, serv. dir., Toledo, for adult swimming pools of inverted hat type and reconstructing children's pools, **$580,000**; constructing recreation bldg. and indoor pool, near downtown, **$185,000**; imprv. Ottawa Park, incl. storage house for equip. and playground apparatus, **$150,000**, bridges, **$175,000**, and storm sewers, $20,000. C. Hatch, Court House, Zone 2, engr. CD 11/29—ENR 12/14.

Okla., Anadarko—AIRPORT—City, plans 5% completed airport, **$350,000.** CAA. Financing available. Site not secured. Hudgins Ball & Co., Cotton Exch. Bldg., Oklahoma City, consult. engrs. CD 1/11—ENR 1/26.

Okla., Nowata—AIRPORT—City, plans 5% completed airport. **$150,000.** CAA. Financing not available. Site not secured. Toler & Willis, Drew Bldg., Tulsa, consult. engrs. CD 1/12—ENR 2/8.

Okla., Pryor—AIRPORT—City, City Hall, plans 5% completed airport. **$150,000.** Land rights not cleared, financing not provided. R. Collins, McAlester, consult. engr. CD 1/12—ENR 2/8.



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POSTWAR PROJECTS (Cont'd.)

Okla., Wilburton—AIRPORT—City, City Hall, plans 5% completed airport. $75,000. Land rights not cleared, financing not provided. CD 1/12—ENR 2/8.

Ore., Medford—PARK IMPROVEMENTS—City, C. A. Meeker, City Hall, bond election June 22, park imprvs. $75,000. D. T. McDonough, City Hall, city engr.

R. I., East Providence—RUNWAYS, etc.—American Aircraft, Inc., c/o Snow Motor Mart, 119 Snow St., Providence, sketches by O. DiSaia, 703 Gardner Bldg., Providence, runways, taxistrips, hangars and offices, Newport Ave. To exceed $100,000.

Tex., Dallas — AIRFIELD BLDG. — City, City Hall, plans 25% completed expan. Love Field administration bldg., incl. 2 wings, etc. $150,000. Financing not provided. T. Broad, Burt Bldg., archt. CD 12/4—ENR 12/14.

Tex., San Antonio — HANGARS — Union Bus Line, c/o J. Amberson, 107 Kayton St., plans 50% completed by W. N. Noonan, 720 Travis Bldg., two 30x284 ft., steel, corrugated asbestos hangars. $70,000. Financing provided. CD 3/7—ENR 3/22.

Wash., Walla Walla—MEMORIAL PARK—City, City Hall, plans under way veterans memorial park, $200,000. Financing not provided.

READY FOR BIDS

Tex., Amarillo — BROADCASTING STATION—Amarillo Broadcasting Co., 109 E. 5 St., plans completed frequency modulation radio broadcasting station. $40,000. Financing available. CD 2/28—ENR 3/22.

Tex., Beaumont—BROADCASTING STATION—K.R.I.C. Inc., Beaumont, plans completed frequency modulation radio broadcasting station. $40,000. Financing available. CD 2/28—ENR 3/22.

Tex., Dallas—BROADCASTING STATION—K.R.L.D. Radio Corp., Adolphus Hotel, plans completed frequency modulation radio broadcasting station. $40,000. Financing available. CD 2/28—ENR 3/22.

Tex., Harlingen—BROADCASTING STATION—Valley Publishing Co., Harlingen, plans completed frequency modulation radio broadcasting station. $40,000. Financing available. CD 3/2—ENR 3/22.

Tex., Houston—BROADCASTING STATION—Houston Printing Corp., 2318 Polk St., plans completed frequency modulation radio broadcasting station. $40,000. Financing available. CD 4/2—ENR 3/22.

Tex., Houston—BROADCASTING STATION—K.T.R.H. Broadcasting Co., Rice Hotel, plans completed frequency radio modulation broadcasting station. $40,000. Financing available. CD 3/2—ENR 3/22.

Tex., McAllen — BROADCASTING STATION—Valley Evening Monitor, McAllen, plans completed constructing frequency modulation radio broadcasting station. $25,000. Financing provided. CD 2/23—ENR 3/22.

Tex., San Angelo—BROADCASTING STATION—KGKL, Inc., San Angelo, plans completed frequency modulation radio broadcasting station. $40,000. Financing provided. CD 3/2—ENR 3/22.

Tex., San Antonio—BROADCASTING STATION—Walmac Co., State KMCA, c/o National Bank Commerce Bldg., plans completed frequency modulation radio broadcasting station. $40,000. Financing provided. CD 3/2—ENR 3/22.

Tex., Waco—BROADCASTING STATION—Frontier Broadcasting Co., Inc., Waco, plans completed constructing frequency modulation radio broadcasting station. $40,000. Financing provided. CD 2/28—ENR 3/22.

Tex., Waco—BROADCASTING STATION—Industries, Inc., Station WOAD, Waco, plans completed frequency modulation radio broadcasting station. $40,000. Financing provided. CD 2/28—ENR 3/22.

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PROPOSED WORK

†**Ark., Bearden**—City, WW imprvs. $18,500. **FWA.** CD 4/12—ENR 4/19.

Calif., Long Beach—City, City Hall, 23,500 lin. ft. 30 in. steel watermain, to extend Met. Water Dist. lines, here. $300,000. G. E. Baker, City Hall, city engr.

†**Fla., Pinellas**—Bd. Comrs. Pinellas Co., WW imprvs. incl. 20 mi. main exten. $246,-900. **FWA.**

†**Ga., Valdosta**—City, municipal water sys., addns., repairs **$74,000. FWA.**

†**Ind., Charlestown** — Federal Works Agency, 18 and F Sts. N.W., Wash. 25, D. C., water and sewer facilities at 3 Federal housing, $80,000. **FWA.**

Miss., Laurel—City, c/o Mayor and Aldermen, City Hall, addnl. WW facilities, and improvs., repairs to existing facilities, $65,-000. H. A. Metz, Hammond, La., engr.

Ore., Gearhart—City, City Hall, voted bonds, reconstructing water distr. sys., incl. 12,000 ft. 6 to 8 in. c. i. pipe. $40,000. R. H. Corey, Corbett Bldg., Portland, engr. CD 3/7—ENR 3/15.

Ore., The Dalles—H. G. Miller, et al, The Dalles, 6 wells, 6 pump. plants irrigating 3,500 acres. $350,000.

Wash., Sedro Woolley—State Dpt. Finance, Insurance Bldg., Olympia, wells, pumphouse, 2,000 ft. pipe, electric controls, etc. for water sys. at Northern State Hospital. $30,000. Jas. W. Carey & Associates, Alaska Trade Bldg., Seattle, engr.

Que., Maniwaki—Corp. Village of Maniwaki, constructing bldg., drill well and install oquip. $18,000.

BIDS ASKED

Bids Asked June 4

Ia., Newton—City, H. J. Lammers, clk., water wells. $15,000.

Bids Asked June 5

†**Ark., North Little Rock**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., concrete water reservoir, Proj. 2400.

Bids Asked June 7

Mass., Kingston (br. Plymouth)—Town, Bd. Water Comrs., Kingston, c.i. watermain. Hayden, Harding & Buchanan, 662 Park Square Bldg., Boston, engrs. CD 5/22—ENR 5/24.

Bids Asked June 13

N. J., Roseland—Boro, H. Meisinger, boro clk., Boro Hall, 4,000 lin. ft. watermain, appurtenances in Passaic Ave. from Glen Ave. to point about 600 ft. south of Harrison Ave. Miller & McGiffert, 484 Bloomfield Ave., Montclair, boro engrs.

Bids Asked June 12

R. I., Smithfield—Northwestern Water Co., Main St., water sys. distr., incl. booster station, standpipe, appurtenances, Smithfield & Gloceter, over $15,000. Fay Spofford & Thorndike, 11 Beacon St., Boston, Mass., engrs.

Bids Asked June 29

N. J., Fairlawn—Mayor and Borough Council, Municipal Bldg., sewerage sys., appurtenances, Passaic River crossings, appurtenances. Plans deposit $25. Thomas F Bowe, 110 William St., New York, N. Y., consult. engr.; adv. ENR 5/31. CD 5/18—ENR 5/24.

LOW BIDDERS

Wash., Carbonado—Carbonado Water Dist., Carbonado, Apr. 26, water distr. sys., from Gallagher, Kirk & Thomas, 326 Perkins Bldg., Tacoma, **$33,841.** T. C. Breitenstein, Hoge Bldg., 2 and Cherry Sts., Seattle, Zone 4, engr. CD 4/17—ENR 4/19.

CONTRACTS AWARDED

Mass., Andover—Town, C. T. Gilliard, supt. P. Wks., 2 mi. 12 in. watermain, Haggetts Pond Rd., to R. Zoppo, 44 Ramsdell Ave., Roslindale, **$26,704.** Bids 5/21. CD 5/14—ENR 5/17.

†**N. Y., Deer Park**—U. S. Eng., 120 Wall St., New York, Zone 5, addnl. water supply, Mason General Hospital, Contr. W-30-075-eng-2604, to Long Island Water Supply Co., Inc., Syosset, **$15,257.**

Tex., Houston—City, City Hall, 5,300 lin. ft. 30 in. c.i. water pipe, fittings for main line to water well on Alief Rd., to Lock Joint Pipe Co., Ampere, N. J., **$39,742.**

Que., St. Jacques de Plles—Municipality, installing WW, to G. A. Gruninger, 1000 Laviolette St., Three Rivers, **$31,988.** Est. $32,000. Bids 5/7—CD 5/2.

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Name in order of Listing)

Water Supply — Latin America
Sewers, Waste Disposal — Public Buildings
Bridges — Commercial Buildings
Streets & Roads — Industrial Buildings
Earthwork, Waterways — Unclassified

Stages Reported

PROPOSED: (except Streets & Roads): BIDS ASKED (new announcements only). For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

†**Colo., Aurora**—City, sanitary sewer facilities. $90,800. **FWA.** CD 4/30—ENR 5/3.

†**Fla., Fort Myers**—City, sewerage extens., $300,000. **FWA.** CD 2/2—ENR 2/8.

†**Fla., Leesburg**—City, sewage disposal plant imprvs., addns. $70,000. **FWA.**

†**Idaho, Mountain Home**—City, City Hall, sewage treatment plant with Imhoff tank and sludge drying beds. $30,000. **FWA.** J. W. Bouton, Robert Noble Bldg., Boise, engr. CD 5/2—ENR 5/10.

Me., Winthrop—Sewer Comn., Town Hall, sewers, sewage treatment plant. Over $25,000. Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., engrs.

†**Md., Middle River**—Federal Works Agency, Lemon Bldg., 1729 New York Ave. N.W., Wash. 25, D. C., addnl. sewage facilities, 30 and 21 in. pipe, and sewage pump. station, $161,000.

†**O., Cambridge**—City, City Hall, sewage disposal plant, $122,300; sewage lift station, $10,000; sewer extens. and lift station in East Cambridge, $28,000. **FWA.** P. Sheehen, City Hall, city engr.

†**S. D., Rapid City**—City, J. Lake, mgr., exten. sewerage sys., $115,000. **FWA.**

Tex., Dallas—Dallas Co. Water Control & Imprvt. Dist. 3, $210,000 bond election June 16, sewerage sys. and disposal plant, near here. CD 4/25—ENR 5/3.

Tex., Houston—City, City Hall, addnl. sanitary sewers for Lum-Terrace-Colfcrest Sys. Over $25,000.

Man., Winnipeg — Municipality, sewers. $120,000 voted. W. D. Hurst, City Hall, engr.

BIDS ASKED

Bids Asked June 7

Mass., Dedham—Town Bd. Selectmen, Town Hall, laying sewer lines in 7 streets. E. Worthington, 26 Norfolk St., engr.

Bids Asked June 12

†**Tex., Weatherford**—Town, sanitary sewerage sys. imprvs., Tex. 41-701. $30,000. **FWA.** J. J. Rady, Insurance Bldg., Fort Worth, engr.

CONTRACTS AWARDED

Miss., Woodville—City, W. J. Stockett, mayor, City Hall, sewerage sys. and treatment plant, to D. W. Winkleman Co., P.O. Box 261, New Orleans, La., **$84,280.** Est. $85,000. Bids 5/8. CD 4/20—ENR 4/26.

Ont., Hamilton—A. Lawrence, mayor, City Hall, sewers, Barton St., Melvin, Fennel, Julian and Ivan Aves., to Storms Contg. Co., Ltd., 49 Givens St., Toronto, **$28,250.** Bids 3/8. W. L. McFaul, c/o owner, engr.

Ont., Chatham — Twp. Council, Court House, drain repairs, to Denstedt Bros., Millverton, **$25,770.** W. G. McGeorge, Court House, engr.

BRIDGES

PROPOSED WORK

†**Calif., Los Angeles**—City, 3 culverts draining water from Bixby Slough into West Basin of Los Angeles Harbor to prevent blocking of highway, $326,179. **FWA.**

Ia., Sioux City—Woodbury Co., Sioux City, bridges, culverts, $46,001. J. C. McLean, co. engr.

†**Wash., Tacoma** — City, City Hall, redecking 11 St. bridge, replacing concrete decking on steel grating and floors of fixed span, 1,075 ft. long, 50 ft. in road width and replacing 10 ft. wooden sidewalks on both sides with concrete, Wash. 45302N. $83,500. **FWA.** B. Bantz, City Hall, city engr.

Ont., Hilton—Province of Ontario, Toronto, bridge connecting St. Joseph Island, affecting 4 municipalities on Island with the mainland. $50,000. Dpt. Hys., Toronto, engr.

Que., St. Cesaire—Dpt. P. Wks., Quebec City, bridge. $30,000.

BIDS ASKED

Bids Asked June 5

Massachusetts—Commonwealth of Mass., Dpt. P. Wks., Boston, bridge, approaches over Connecticut River, Agawam and W. Springfield, SPW-FAP 136-D(1). $220,000. Plans deposit $10.

Bids Asked June 13

New Jersey—S. Miller, comr. State Hy. Dpt., Trenton, making exploratory berings for 24 bridges on State Hy. Routes 3, 83 and 6, Hudson, Passaic, Essex and Morris Counties. Plans deposit $10. A. L. Grover, ch. clk.; adv. ENR 4/31.

CONTRACTS AWARDED

Florida—State Rd. Dpt., Tallahassee, bridge over Choctawhatchee River, Rd. 152, Bay Co., to Hardaway Contg. Co., 15 11 St., Columbus, Ga., **$34,871*****bridge over North Bay, Lynn Haven, Rd. 52, Bay Co., to Hillyer & Lovan, Consolidated Bldg., Jacksonville, **$355,732*****bridge adjacent to State Rd. 4 on Key Vaca, Monroe Co., to Belcher Oil Co., 1221 Biscayne Blvd., Miami, **$30,689.** Grand total $421,292. Bids 5/17. CD 5/2—ENR 5/10.

†**N. Y., Niagara Falls**—U. S. Eng., 120 Wall St., New York, Zone 5, culvert for Niagara Creek, to Fago Constr. Co., 2297 Bailey Ave., Buffalo, Zone 11, **$52,370.** CD 4/19.

†**Pa., Neville Island (br. Pittsburgh)**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., repairing Fleming Park Bridge, NOY 12539, to John F. Casey Co., P. O. Box 1888, Pittsburgh, **$38,027.**

Pa., Phila.—Reading Co., E. Y. Allen, ch. engr., Reading Terminal, Zone 1, Arch St. bridge repairs, to Irwin & Leighton, 1505 Race St., **$29,300.** Awarded 5/18.

Wyoming—State Hy. Comn., Cheyenne, bridge, culverts on 9.739 mi. Sheridan-Buffalo Rd., Sheridan Co., to N. A. Nelson Constr. Co., Sheridan, **$63,211.** Bids 5/22. CD 5/16.

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STREETS AND ROADS

BIDS ASKED

Bids Asked June 4

Pa., Hatboro—Boro, Boro Office, road resurfacing. $25,000. G. B. Melus, 112 S. Caston Rd., Glenside, boro engr.

Bids Asked June 5

Indiana—State Hy. Comn., J. H. Lauer, chn. Indianapolis highway surface treatment sundry roads, 60.79 mi. Contr. M-2578, Montgomery, Tippecanoe and Fountain Counties; 53.21 mi. Contr. M-2579, Grant, Huntington, Wells and Wabash Counties; 52.22 mi. Contr. M-2580, Randolph, Wayne, Hamilton, Madison and Henry Counties; 49.86 mi. Contr. M-2581, LaPorte, St. Joseph, Newton, Jasper and Porter Counties; 50.08 mi. Contr. M-2582, White, Carroll, Cass, Miami, Jasper and Pulaski Counties; 50.5 mi. Contr. M-2583, Ripley, Dearborn, Jefferson and Switzerland Counties; 56.5 mi. Contr. M-2584, Johnson, Shelby, Harrison, Floyd, Clark, Washington, Scott and Jefferson Counties; 56.51 mi. Contr. M-2585, Sullivan, Knox, Greene, Clay and Washington Counties; 60.14 mi. Contr. M-2586, Pike, Spencer, Dubois and Crawford Counties. E. C. Vogelsang, c/o owner, ch. engr.

Bids Asked June 5

Ill., Chicago—City, Dpt. P. Wks., City Hall, sheet asphalt resurfacing S. Pulaski Rd., W. 41 to W. 31 Sts., Sec. S.A. 51-1011 C.S. Plans deposit $10.

Bids Asked June 5

Pennsylvania—Dpt. Hys., Harrisburg, bituminous surfacing, etc. 1.77 mi. Traffic Route 562, Exeter Twp., St. Lawrence Boro, Berks Co.; 5.47 mi. U.S. Route 219 and Rural Route 11036, Cambria and Gallitzin Twps., Ebensburg Boro, Cambria Co.; 1.2 mi. U.S. Route 322, Honeybrook, West Brandywine and East Brandywine Twps., Chester Co.; 3.92 mi. Traffic Routes 88, 166 and 18, and Rural Route 37041, Neshannock Twp., city of New Castle, Lawrence Co.; 3.39 mi. U.S. Routes 15 and 220, city of Williamsport, Loyalsock and Old Lycoming Twps., Lycoming Co.; 508,964 sq. yd. roads in Philadelphia, Springfield Twp., Philadelphia and Montgomery Counties; 4.3 mi. U.S. Route 209, Frailey, Tremont and Reilly Twps., Schuylkill Co.

Mich., Midland—A. E. Coons, city clk., City Hall, constructing Jefferson Ave., incl. Contr. 1, approx. 40,000 cu. yd. earth excav., 7,000 cu. yd. sand backfill, 20,000 lin. ft. curb and gutter and 9,800 cu. yd. gravel, drainage work; Contr. 2, 390 tons Type B regular surfacing Laykold pavement. Plans deposit $10.

Bids Asked June 6

Kansas—State Hy. Dpt., La Crosse, resurfacing material 1 mi. Proj. 5683, Rusk Co. Plans deposit $25. R. C. Keeling, Topeka, engr.

Bids Asked June 6

Kansas—State Hy. Dpt., Ness City, bit. surf. reconst. and single asphalt surface treating 4.009 mi. Proj. K 6070, Meade Co.; 19.31 mi. Proj. K 6069 Pts. 1 and 2, Ness Co.; 13.285 mi. P. 6071, Seward Co.; resurfacing material 12.025 mi. P. 6531, Lane Co.; 9.994 mi. P. 6533; 4.596 mi. P. 6535; 8.315 mi. P. 6534, foregoing in Meade Co.; 10.868 mi. P. 6537; 19.964 mi. P. 6538 AN and 4.081 mi. P. 6539, foregoing Ness Co.; 12.078 mi. P. 6541, Scott Co.; 15.379 mi. P. 6543, Stanton Co.; 15.2 mi. P. 6517, Wichita Co.; bit. sealing 4.04 mi. P. 6520; 14.106 mi. P. 6521 AB; 13.838 mi. P. 6522, ABC foregoing in Clark Co.; 9.64 mi. P. 6523, Finney Co.; 3.635 mi. P. 6524 AB; 6.616 mi. P. 6525 AB, both Ford Co.; 14.347 mi. P. 6526 AB; 10.397 mi. P. 6527, both in Greeley Co.; 19.418 mi. P. 6529, Hamilton Co.; 24.109 mi. P. 6528; 12.2 mi. P. 6530, both Haskell Co.; 12.369 mi. P. 6532 AB, Lane Co.; 15.657 mi. P. 6536, Morton Co.; 11.855 mi. P. 6540 AN, Scott Co.; 7.485 mi. P. 6542, Seward Co. R. C. Keeling, Topeka, engr.

N. Y., Staten Island—President Richmond Boro, Boro Hall, Zone 1, asphalt macadam on concrete repaving Arden Ave. from Hylan Blvd. to Amboy Rd.; bituminous concrete repaving Morningstar Rd. from Richmond Terrace to point about 700 ft. south, and from Innis St. to Hooker Pl., etc.

Bids Asked June 8

Kentucky—State Dpt. Hys., Frankfort, bituminous resurfacing 12.64 mi. Boone, Kenton and Grant Counties. Bids 5/11, rejected. CD 5/15—ENR 5/17, under LB.

Bids Asked June 13

California—State Div. Hys., Sacramento, plant mix surfacing repairing 10.1 mi. road between 14.8 and 17.8 mi. east of Maricopa between State Hy. Route 139 and Rosedale and between 2.8 and 3.8 mi. north of State Hy. Route 140, Kern Co. G. T. McCoy, state hy. engr.

Delaware—State Hy. Dpt., F. V. duPont, chn., Dover, furnishing, applying asphaltic material—1945 surface treatment. Contr. 886, New Castle Co.; Contr. 887, Kent Co.; Contr. 888, Sussex Co.; chips for 1945 surface treatment Contr. 889, New Castle Co.; Contr. 890; and for 1945 surface treatment Contr. 890; Contr. 891, all foregoing, Kent Co.; furnishing stone chips, 1945 surface treatment, Contr. 892; furnishing slag chips, Contr. 893; bituminous surface treatment, Contr. 894; sand for 1945 surface treatment, Contr. 895, all foregoing, Sussex Co. W. W. Mack, ch. engr.; adv. ENR 5/30.

STREETS AND ROADS (Bids Asked, Cont'd.)

Louisiana—State Dpt. Hys., D. Y. Smith, Dir., Baton Rouge, shaping roadway, gravel surfacing, culverts, bridges, 201.4 mi. Parish Roads in Louisiana, 90% Maneuver Area Defense Access Army Reservation exten., Proj. DA-WR 500 (2), S.P. 737-00-27, Grant Parish; 45.6 mi. Parish Roads in Louisiana, 90% maneuver Area exten., Defense Access Army Reservation Proj. DA-WR 500 (2), S.P. 737-00-28, Natchitoches Parish; 266.8 mi. Defense Access Army Reservation Proj. DA-WR 500 (2), S.P. 737-00-29, Rapides Parish.

Bids Asked June 14

California—State Div. Hys., State Bldg., Los Angeles, plant mix surfacing with seal coat over existing surface placing local borrow on portions shoulders and reshaping shoulders 2.6 mi. road between Riverside and Colton, Riverside and San Bernardino Counties. G. T. McCoy, Court House, Sacramento, state hy. engr.

Calif., Fairfield—Solano Co., Court House, relocating 1.4 mi. road 2 mi. north of Benicia. Plans deposit $5. J. Burnham, Court House, co. engr.

Bids Asked

Minn., St. Peter—Nicollet Co., H. Overn, Pres., St. Peter, rejected bids Apr. 17, constructing County Ditch 30, etc. $75,000. CD 4/11.

Texas—State Hy. Comn., Austin, rejected bids May 2, imprv. 7.09 mi. Williamson Co. CD 5/8—ENR 5/10, under LB.

LOW BIDDERS

Calif., Long Beach—City, May 21, concrete gutters in San Antonio Heights Dist., from Asco Constr. Co., 2725 Atlantic Ave. $28,-978. G. E. Baker, City Hall, engr.

Ill., Berwyn—E. Vacin, city clk., 1340 Clinton Ave., May 14, bit. concrete paving, concrete curbing and guttering 65 each inlet and valves vaults, etc., 2.3934 mi. hy., from Municipal Paving Co., 5757 Ogden Ave., Cicero, $71,139. E. Hancock, 1509 W. Jackson St., Chicago, engr.

Ill., Oak Park—City, City Hall, May 7, bit. concrete surfacing and leveling course 1.162 mi. Proj. 41-CS, from Municipal Paving Co., 5757 Ogden Ave., Cicero. $40,468. M. S. Dutton, City Hall, comr. P. Wks.

Ill., Ottawa—LaSalle Co., County Bldg., May 2, maintenance furn. at job 32,000 cu. yd. crushed gravel or crushed stone; furnishing 700 tons chl. any railroad siding in County, from LaSalle County Portable, Ottawa, $81,620. F. L. Farnsworth, Ottawa, engr.

†Maryland—Pub. Roads Admin., 1440 Columbia Pike, Arlington, Va., May 22, access road to Indian Head Naval Reservation, MD-DA-NY4-E(2), Prince Georges Co., from Dutcher Constr. Corp., Queenstown, $187,-922. CD 5/3—ENR 5/10.

Md., Baltimore—City, c/o Bd. Awards, City Hall, May 17, imprv. various streets, Contr. CC794, from Paramount Constr. Co., 3700 Gough St., $25,336. CD 5/8—ENR 5/10.

Mass., Attleboro—Town Bd. P. Wks., City Hall, May 22, granolithic sidewalks and granite curbing various streets, from Campenella & Cardi Constr. Co., 50 Sprague St., Providence, R. I., $30,717. CD 5/15—ENR 5/17.

Mich., Detroit—Wayne Co., Barlum Tower, May 14, imprv. 2 mi. Seven Mile Rd., from Frank J. Knight Co., 23845 Sherwood Ave., Centerline, $169,308***1.6 mi. Greenfield Rd. from Denton Constr. Co., 4-255 General Motors Bldg., Detroit, $83,127***3 mi. Van Born Rd., from Lewis & Prisinger, 214 E. Madison St., Ann Arbor, $113,711. CD 5/8—ENR 5/10.

★**Pennsylvania**—State Hy. Dpt., Harrisburg, May 22, imprv. 1.87 mi. Allegheny Co., from Allegheny Asphalt & Paving Co., 411 Blvd. of Allies, Pittsburgh, $59,056***8.08 mi. Allegheny Co., from McCrady Constr. Co., 304 Ross St., Pittsburgh, Zone 19, $319,533***1.72 mi. Clinton Co., from The Interstate Amesite Co., Delaware Trust Bldg., Wilmington, $34,758***2.68 mi. Indiana Co., from John B. Schultz Contg. Co., Inc., Buffalo, N. Y., $161,285***1.63 mi. Sullivan Co., from F. D. Kessler, Inc., Northumberland, $60,230***8.93 mi. Warren Co., from Fago Constr. Co., 2297 Bailey Ave., Buffalo 11, N. Y., $322,453. CD 5/3—ENR 5/10.

Wash., Olympia—Thurston Co., Courthouse, May 21, penetration oiling resurfacing 62 mi. roads from Diesel Oil Sales Co., 2155 Northlake Ave., Seattle, Zone 3, $48,263. Est. $45,000. CD 5/10.

†Wash., Seattle—U. S. Eng., 1400 Textile Tower Bldg., Seattle, Zone 1, May 22, paving, constructing storm drainage sys. around vehicle processing shop at Port of Embarkation, Neg. 1136, from Washington Asphalt Co., 309 W. 39 St., Zone 7, $30,903.

Wash., Tacoma—City Bd. Contr. & Awards, City Hall, May 21, asphaltic concrete resurfacing S. Pacific Ave., A. S. 11, and S. G. Sts., etc., from Woodworth & Co., 1200 E. D. St., $64,812. Est. $90,000. CD 5/11.

CONTRACTS AWARDED

California—State Div. Hys., Sacramento, imprv. 6 mi. Alameda Co., to A. S. Jones, Box 3067, Brown's Valley Rd., Napa, $105,-000; 4.2 mi. Contro Costa Co., to Fredrickson Bros., 1259 65 St., Emeryville, $84,640. CD 5/4—ENR 6/10.

Calif., San Mateo—City, City Hall, grading, surfacing, curbing, guttering, sidewalks, sanitary and storm sewers in College Park Nos. 2 and 3, to Union Paving Co., 212 Babcock Bldg., San Francisco, $28,986. Imp. streets, sidewalks, sewers, etc., in San Mateo Terrace 7, to L. C. Smith, First and Railroad Sts., $52,335. H. Porter, City Hall, city engr.

Conn., New Haven—City, Hall of Records, City Hall, asphalt paving and repairing trolley track area, Olive, Water, State and part of Meadow Sts., to O. C. Balkealee & Sons, Inc., 58 Waverly St., $58,000***portions Howard Ave., to Pavements, Inc., 10 Whitney Ave., $34,000***S. Front St.., Dixwell Ave., to D. V. Frione & Co., Inc., 87 Foxon Rd., $54,000. Grand total $146,000.

Idaho—Comr. P. Wks., Boise, stockpiling maintenance material, in Ada and Payette Counties, to T. Marrazzo, 3317 Morris Hill Rd., Boise, $29,500. Bids 5/11, awarded 5/14.

Ind., Fort Wayne—Allen County Bd. Comrs., Court House, constructing, resurfacing, repairing 64 mi. bituminous hys., Allen Co., to Harris Constr. Co., 205 Standard St., $70,000. Awarded 5/15.

Man., Fort Garry — Municipality, J. E. Trothier, clk., concrete sidewalks on 4 streets, graveling 5 streets, day labor, $45,000.

Minn., Breckenridge—Wilkin Co., E. Anderson, aud., graveling roads, to DeRuyter Bros., Willmar, $26,080. Bids 5/10.

N. J., Mount Holly—Burlington Co., dirt road maintenance, own forces. $50,000.

N. J., New Brunswick—Middlesex Co., dirt road maintenance, own forces. $50,000.

N. J., Trenton—Mercer Co., Trenton, dirt road maintenance, own forces. $50,000.

★**Oregon**—State Hy. Comn., Capitol, Salem, grading, 2 concrete bridges and 4 concrete box culverts, 2 timber bridges, furnish gravel in stockpiles, bituminous macadam surfacing 4.36 mi. Coyote Creek-Grave Creek Sect. Pacific Hy., Proj. SN-U-FAP-138-B (1), Josephine Co., 866,000 yd. excav., 1,250 yd. concrete, 214,000 lb. metal reinforcement, 620 ft. metal handrail, 40,000 yd. gravel, 520 tons liquid asphalt, to McNutt Bros., Eugene, $601,501; grade widening 0.35 mi. Myrtle Point-Elbow Point and Cape Sebastian sections Coos Bay-Roseburg and Oregon Coast Hys., Coos and Curry Counties, to J. A. Logan, 7,800 N.E. Killingsworth, Portland, $32,982. Awarded 5/16. R. H. Baldock, Capitol, Salem, engr.

†Va., Portsmouth—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., repairing roads, constructing curbing, gutters and culverts, Gosport Housing, Norfolk Navy Yard, NOY 11948, to Asphalt Paving Services, Inc., 10 N. 15 St., Richmond, $49,831.

Washington—State Hy. Dpt., Olympia, imprv. Mason and Kitsap Counties, to L. Coluccio, 1642 Lane St., Seattle, $55,209; 5.33 mi. Clark and Cowlitz Counties, to L. Romano Engrg. Co., Arctic Bldg., 3 and Cherry Sts., Seattle, Zone 4, $88,852. Bids 5/22. CD 5/8—ENR 5/10.

Wyoming—State Hy. Comn., Cheyenne, imprv. 16.156 mi. Natrona Co., to Taggart Constr. Co., Cody, $24,916; 9.739 mi. Sheridan Co., to Big Horn Constr. Co., Sheridan, $34,419. Bids 5/22. CD 5/16.

EARTHWORK, WATERWAYS

PROPOSED WORK

Newfoundland—Government of Newfoundland, St. Johns, breakwater, Bay de Verde. $50,000. Dpt. Natural Resources, St. Johns, engr.

Newfoundland, Bonavista—Govt. of Newfoundland, St. Johns, breakwater, $47,000. Dpt. Natural Resources, St. Johns, engr.

BIDS ASKED

Bids Asked June 20

†Colorado — Bureau Reclamation, Court House, Denver, furnishing, f.o.b. cars at shipping point or f.o.b. cars Granby, two 9x10 ft. radial gates, with 5 in. diam. rollers, pin bearings, 10-in. wall plates with butt splices and gate sills; two 5,000 lb. motor-driven radial gate hoists for installation in gate structures of Continental Divide Tunnel, Colorado-Big Thompson Project, Spec. 1805-D. W. R. Walker, ch. engr.

LOW BIDDERS

N. J., Princeton—Dpt. Conservation & Development, C. P. Wilbur, dir., State House Annex, Trenton, Zone 7, May 21, rein.-con. aqueduct on Delaware and Raritan Canal incl. removal existing structure, from Franklin Contg. Co., 20 Washington St., Newark, $75,200. CD 5/4—ENR 5/10.

†Tex., Rusk—U. S. Eng., 606 Santa Fe Bldg., Galveston, May 18, levee repairs for Henderson County Imprvt. Dist. 1, Trinity River, from Clynch Bros. Constr. Co., P.O. Box 564, Childress, approx. $28,330.

†Tex., Kaufman—U. S. Eng., 606 Santa Fe Bldg., Galveston, May 18, levee repairs, Serial No. W-41-243-eng-45-C1-7, from Fred Hall & Son, P.O. Box 1188, Waco, $32,715.

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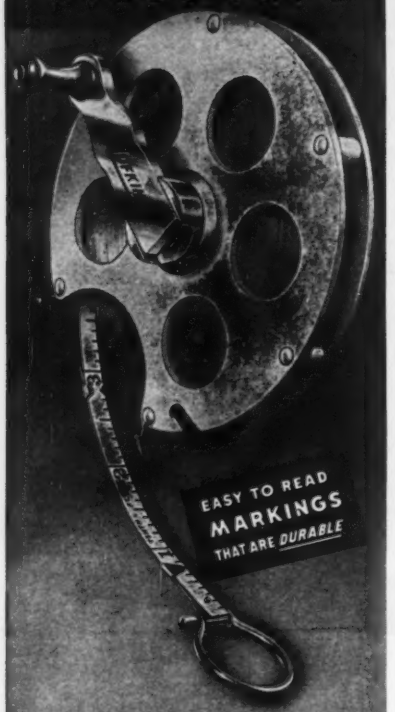

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CONTRACTS AWARDED

Fla., Jacksonville Beach—City, repairing, exten. seawall to B. B. McCormick & Sons, Inc., 1 Ave. S., **$37,326.** Bids 5/7, awarded 5/16. J. Q. Palmer, City Hall, city mgr.

LATIN AMERICA

Bolivia, Sud Chichas—Republic of Bolivia, La Paz, plans lead smelter producing between 300 and 400 tons refined lead a month. $100,000.

Colombia, Barranquilla—Industrias Resol, Barranquilla, plans plant converting distillation of spirits. $125,000.

Guatemala, Guatemala City—Republic of Guatemala, Guatemala City, plans penitentiary housing 1,500 prisoners. $450,000. Ministry of National Economy, Guatemala City, engr.

Guatemala, Guatemala City—Republic of Guatemala, Guatemala City, plans addns. to Roosevelt Hospital, 1,700,000 quetzales. Ministry of Health, Guatemala City, archt.

Guatemala, Guatemala City—Republic of Guatemala, Guatemala City, plans 300 dwellings, 900,000 quetzales. Credito Hipotecario Nacional, Guatemala City, archt.

Mexico—Cia. Mexicana de Envases del Golf., Sa. (director Antonio Rivero, c/o Coco Cola, Mexico City), Mexico City, takes bids within 90 days, constructing tin container mfg. planta, at Cordoba, state of Vera Crus, and others on sites to be selected in Yucatan and Campeche. $200,000.

Mexico — Federal Dpt. P. Wks., Manuel Tornel, dir., Tacuba St., Mexico City, will construct railroad line between Creel, Chihuahua and San Pedro, Sinaloa, building and repairing stations, setting new rails between Chihuaha City and Ojinaga, by own forces. **$850,000.**

Mexico—Federal District, Rojo Gomez, mayor, Mexico City, will construct and repair road between Mexico City and Xochimilco, resort town, by own forces. **$450,000.**

Mexico—State of Chihuahua (State Senator Benjamin Almeida, Jr.), Chihuahua City, will construct roads and other public works (mostly roads) by own forces. **$2,800,000.**

Mexico—State of Colima, Governor Manuel Gudino, Colima, will construct, repair roads throughout state, by own forces. **$500,000.** CD 4/4—ENR 4/19.

Mexico—State of Hidalgo, Gov. Jose Lugo Guerrero, Capital City, Pachuca, will construct roads, repair present ones, throughout state, by own forces. **$1,000,000.**

Mexico—State of Mexico, Gov. Isidrio Fabela, Capital City, Toluca, will repair roads throughout state, incl. Toluca-Queretaro Rd., etc., by own forces. **$100,000.**

Mexico—State of Oaxaca, Edmundo Sanchez Cano, gov., Oaxaca, will construct and repair roads throughout state and some drainage work, by own forces. **$400,000.**

Mexico, Cosamaloapan — Federal Health Ministry, Dr. Gustavo Baz, secy., Mexico City, takes bids late in June, hospital. $250,000.

Mexico, Culiacan—Jose Z. Espinosa (also Diego Redo), General Delivery, Culiacan, takes bids in June, constructing sports stadium, stands, track. $100,000.

Mexico, El Bajito—State of Oaxaca, Gov. Vincente Gonzales Fernandez, bids within 90 days dam on El Bajito River in El Bajito section for irrigation, $140,000.

Mexico, Guaymas — Cia. Maritima del Centro, Ejido, 9-31-32, Mexico, D. F., Sonora, plans seafood icing, refrigeration and packing plant. $250,000.

Mexico, Juarez—City of Juarez, Municipal Hall, bids probably in 30 days, school. $175,000.

Mexico, Juarez — City, Mayor Arturo Chavez, Municipal Hall, Juarez, will construct roads, highways, bridges, water and sewerage imprvs., by own forces. **$800,000.**

Mexico, Mazatlan—City of Mazatlan, Municipal Bldg., Dr. Gustavo Baz, Federal Health Secy., Mexico City, takes bids within 90 days, hospital. $440,000. CD 5/14—ENR 5/24.

Mexico, Mexico City—Cesar Guerra, Gabriel Leyva, 41, Mexico City, c/o Follies Theatre, takes bids in July, 3,000 persons seating capacity theatre, on Gabriel Leyva, near present site Follies Theatre. $400,000.

Mexico, Mexico City—Cia Nacional de Clavos, Lago Alberto, 365 Col, Veronica, S. A., plans fencing barbed wire factory. $150,000.

Mexico, Mexico City—General Neon de Mexico S.A., I. B. Sutton, dir., Mexico City, bids within 30 days, plant mfg. neon installations. $40,000.

Mexico, Mexico City—Metales S.A., 20 de Noviembre, 82-332, Mexico, D.F., plans metallic articles factory. $250,000.

Mexico, Mexico City—Gomez y Valverde, Antonio Plaza, 67, Col. Algarin, Mexico, D.F., plans rayon waste from short fibers of vegetable origin mill. $100,000.

Mexico, Mexico City—Papeles Extrafinos de Mexico, S.A., S. Juan de Letran, 41-408, Mexico, D.F., plans cigarette paper factory. $100,000.

Mexico, Mexico City—Troquelados Y Carrilerias S.A., Enrique Sada Muguerza, dir., Mexico City, bids within 30 days factory producing truck and automobile bodies. $50,000.

Mexico, Oaxaca—State of Oaxaca, Gov. Vincente Gonzalez Fernandez, Oaxaca, plans electric light plant for city and suburbs. $150,000.

Mexico, Oaxaca—State of Oaxaca, Edmundo Sanchez Cano, gov., Oaxaca, takes bids in August, hospital. $250,000.

Mexico, San Buenaventura—Nat. Irrigation Com., Balderas y Ayumiento, bids June 20, dam to empound 120,000,000 cu. meters irrigating 27,000 acres. $1,450,000.

Mexico, Vera Cruz—Cemento Veracruz, S.A. (Carlos Trouyet), Vera Cruz, takes bids within 90 days, cement factory. $600,000 equipped.

Nicaragua, Managua — Servicio Interamericano de Aviacion, Managua, plans airport. $175,000.

Santo Domingo, Ciudad Trujillo—Dominican Republic, Ciudad Trujillo, plans low cost housing for workers earning less than $100 per month. $500,000. Director General Public Works, Ciudad Trujillo, engr.

Venezuela, Caracas—Municipality, plans water treatment plant and distr. mains. $100,000.

Venezuela, Caracas—Municipality, plans sewage disposal plant. $75,000.

Venezuela, Caracas—Republic of Venezuela, Caracas, plans hospital, Central University of Venezuela. $500,000.

Venezuela, Estado Carabobo—Republic of Venezuela, Caracas, plans airdrome. $150,000.

Venezuela, Estado Miranda — Republic of Venezuela, Caracas, plans airdrome. $200,000.

Venezuela, Higuerote—Republic of Venezuela, Caracas in association with Linea Aeropostal Venezolana, Caracas, plans airdrome. $200,000.

Venezuela, Maracaibo—Republic of Venezuela, Caracas, plans 1,000 unit workers housing development. Approx. $600,000. Dpt. P. Wks., Caracas, engr.

Venezuela, Puerto Cabello—Republic of Venezuela, Caracas, plans airdrome, $150,000.

PUBLIC BUILDINGS

PROPOSED WORK

†**Ala., Enterprise**—Federal Works Agency, Enterprise, recreation bldg. for service men, $69,500. **FWA.**

†**Ala., Mobile**—Bd. School Comrs. Mobile Co., repairs, addns., at Baker, Union, Theodore, Mertz, Gorgas, Prichard, Spring Hill and Satsuma Schools, $370,000. **FWA.**

†**Ala., Tuscaloosa**—Stillman Institute, Tuscaloosa, two 2 story, wings, 2 story addn., alterations, etc., $140,000. **FWA.**

†**Ark., Camden**—City, 10-classroom school, near here, $98,300 **FWA.** CD 4/20—ENR 4/26.

†**Calif., Alameda**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Dinwiddie, Kent, Hass, Buckley, 725 Market St., San Francisco, 100 temporary family dwelling units, Calif. 4074-N.

†**Calif., Burbank**—Sisters of Charity of the House of Providence, St. Joseph Hospital nurses home. $80,000. **FWA.**

†**Calif., Dunsmuir**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Wm. P. Day, 58 Sutter St., San Francisco, 40 temporary family units, Calif. 4077, and 10 converted family units, Calif. 4704. CD 4/19—ENR 4/26.

†**Calif., Oxnard**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Winsor, Soule & J. F. Murphy, 116 E. Sola St., Santa Barbara, 144 dormitory units Calif. 4863.

†**Calif., Oxnard**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash. 25, D. C., 12-classroom temporary school. $158,000. **FWA.**

†**Calif., Salinas**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, plans by Chas. E. Butner, 7 Winham St., 100 trailer family dwelling units, Calif. 4110. CD 5/8—ENR 5/10.

†**Calif., San Diego**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash. 25, D. C., Crown Point School, Calif. 4-650-2.

†**Ind., Bloomington**—Bloomington Hospital, Mrs. C. J. Sembower, pres. Bd. Directors, Bloomington, plans by McGuire & Shook, 1400 Fletcher Trust Bldg., Indianapolis, 2 story, bsmnt., brick, stone, rein.-con. hospital, Ind. 12-223-N. $200,000. **FWA.** CD 5/1—ENR 5/10.

†**Kan., Eudora**—City, 5-classroom school at Federal housing in Sunflower Village, near here, site of Sunflower Ordnance Plant. $163,000. **FWA.**

†**La., New Orleans—U. S. Eng.**, 606 Santa Fe Bldg., Galveston, Tex., postponed indefinitely bids to have been opened May 24, altering 5 detention wards at La-Garde General Hospital, Sol. No. W-41-243-eng-45-MI-26. CD 4/26—ENR 5/10.

†**Md., Annapolis—Yards & Docks**, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., architectural and engineering services by Wilberding Co., Inc., 1822 I St. N.W., Wash., D. C., gas turbine laboratory, U. S. Experimental Station. CD 5/15.

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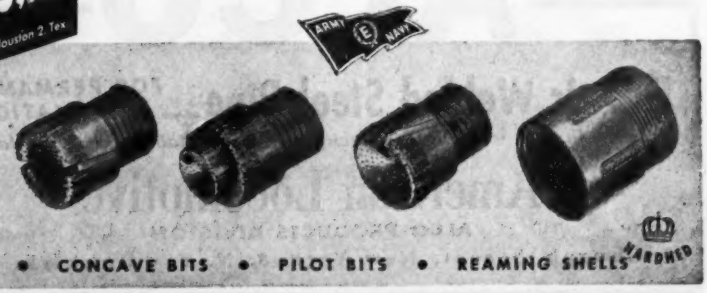

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PUBLIC BUILDINGS (Proposed Work Cont'd.)

†Mich., Buchanan—Buchanan School Dist. 1, Fractional of Buchanan and Niles Twps., 1 story, 8-classroom school, $143,000. **FWA.**

†Nev., Carlin—Pub. Housing Auth., NHA, 760 Market St., San Francisco, Calif., plans by DeLongchamps & O'Brien & Johnson, Phelan Bldg., San Francisco, Calif., 25 temporary family dwelling units, Nev. 26171 CD 4/20—ENR 4/26.

†Nev., Eureka—Pub. Housing Auth, NHA, 760 Market St., San Francisco, Calif., 11 family stop gaps, Nev. 26130.

†Nev., Reno—Pub. Housing Auth., NHA, 760 Market St., San Francisco, Calif., plans by DeLongchamps & O'Brien & Johnson, Phelan Bldg., 760 Market St., San Francisco, Calif., 75 temporary family units, Nev. 26170 and 30 converted family units, Nev. 26167 CD 4/20—ENR 4/26.

†Nev., Tonopah — Pub. Housing Auth., NHA, 760 Market St., San Francisco, Calif., plans by J. Francis Ward, 369 Pine St., San Francisco, Calif., 100 temporary family dwelling units, Nev. 26167. CD 4/25—ENR 5/3.

O., Mt. Vernon—City, plans by Hahn & Hayes, 723 Adams St., Toledo, 1½ story bsmnt., stone facing, cinder block or concrete backup library, $150,000.

†Ore., Cottage Grove—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union Sts., Seattle 1, Wash., plans by R. Morin, Pub. Service Bldg., Portland, 40 family dwelling units, Ore. 35320. $100,000. CD 5/15—ENR 5/17.

†Ore., Eugene—Pub. Housing Auth., NHA, Skinner Bldg., 5 and Union Sts., Seattle 1, Wash., plans by G. B. Smith & Margaret Fritsch, Walling Bldg., conversion of NYA camp into 50 housing units, Ore. 35316 $100,000. CD 4/25—ENR 5/10.

Ore., Eugene—School Bd., Eugene, plans by Wolff & Phillips, Pearson 4th Ave. Bldg., Portland, 1 story Junior High School. $350,000.

†Tenn., Memphis—The Poor Sisters of St. Francis Seraph of the Perpetual Adoration, Lafayette, Ind., enlarging nurses home at St. Joseph's Hospital, 264 Jackson St. $185,000. **FWA.**

†Tex., Borger—Bd. Educ., Borger, plans by M. O. Carder, 317 Fisk Bldg., Amarillo, Senior High School, Tex. 41-719. $360,000 **FWA.** CD 3/29—ENR 4/5.

★ **†Tex., Fort Sam Houston**—U. S. Eng., Fort Sam Houston, A. G. & S. F. Redistribution Station Area 1, conversion, expanding, etc. Army Bldgs. 263, 264, 265 and 266 Ser. No. W-41-154-45-149, over $150,000; Area 2, conversion, repairs, alterations, expanding 29 Army bldgs., incl. heating sys., Ser. No. W-41-154-45-165, over $150,000; construct 70x228 ft. meat, pastry and mess storage shop, Ser. No. W-41-154-45-155, $100,000; converting 16 large mess halls into class rooms, etc., Ser. No. W-41-154-45-164, over $150,000.

†Tex., Fort Sam Houston—U. S. Eng., Fort Sam Houston, bids soon remodeling, rehabilitation 19 permanent brick bldgs. A. G. & S. F. Redistribution Station, Area 1 Ser. No. W-41-154-45-160.

†Tex., Galena Park—W. Hinds, School Supt., Galena Park, plans by Hedrick & Lindsley, So. Standard Bldg., Houston, High School and school addn., Tex. 41-734-C $198,000. **FWA.** CD 4/12—ENR 4/19.

Tex., Houston—City, M. W. Westerman, secy., City Hall, bids soon renovating auditorium. $40,000.

★ **†Tex., Houston**—National Housing Auth., Union National Bldg., 150 housing units $650,000.

†Tex., Vidor—Rural High School Dist., 1 classroom school, and cafeteria bldg. $31,750 **FWA.**

†Wash., Ilwaco—Pacific Co., Court House, South Bend, plans by Barrett & Logan, 1946 S.W. 4 St., Portland, Ore., 1 story, bsmt. hospital addn., Wash. 45318-N. $12,100. **FWA.**

†Wash., Pasco—School Bd., Pasco, plans by G. A. Pehrson, Old National Bank Bldg., Spokane, 2 story, rein.-con., masonry classroom addn. to high school, Wash. 45319-N $30,500. **FWA.**

BIDS ASKED

Bids Asked June 6

Ga., Thomaston—Bd. Educ., Town Hall, school, W. J. Chase, 140 Peachtree St., Atlanta, archts. CD 3/21—ENR 3/1.

Bids Asked June 7

†Ind., Gary—**Gary Bd. School Trustees**, C. D. Lutz, supt., 524 Garfield St., 3 story brick, concrete, steel Roosevelt High School, Ind. 12-226. $315,000. **FWA.** Plans deposit $30, J. H. Wildermuth & Co., 537 Bway., archts. CD 3/27—ENR 3/29.

Bids Asked June 9

Wis., Clintonville—City, 2 story, bsmt., T-shaped 110 x 127 ft., steel, brick hospital, concrete fdn. $170,000. Plans deposit $15, E. A. Stubenrauch, 703 Erie Ave., Sheboygan, archt.

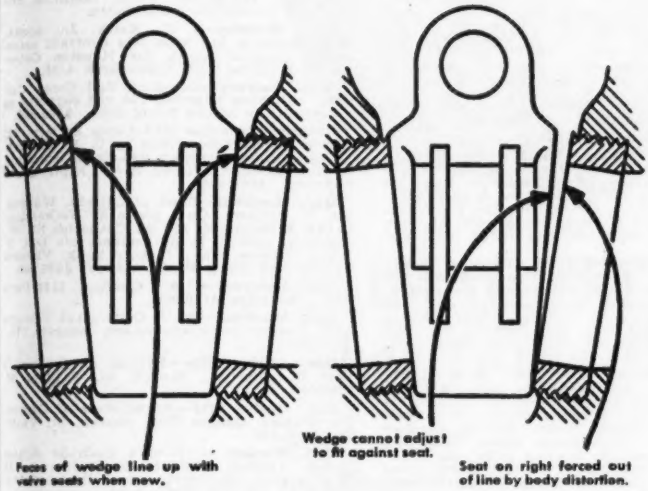
Bids Asked June 12

Tex., Fort Lavaca—City, F. M. Dudgeon, mayor, City Hall, 2 story cold storage bldg. Plans deposit $30. Garrett Engineering Co., 1504 Milam St., Houston, Zone 2, engr.

Bids Asked June 19

†Wis., Wood—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., passenger elevator and hatchway addn. for Bldg. 77.

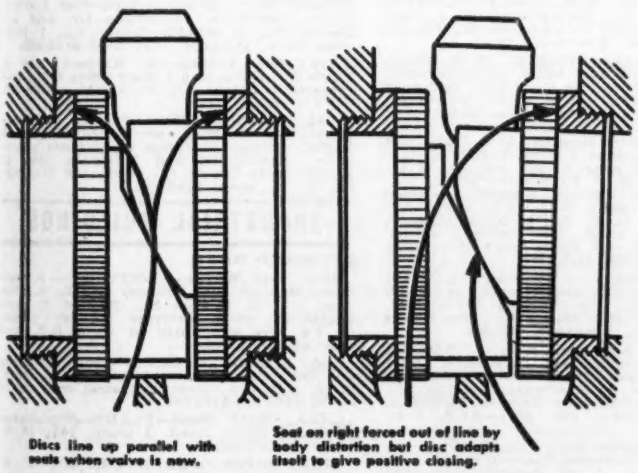
"Body Blows" THAT KNOCK OUT VALVES


Faces of wedge line up with valve seats when new.
Wedge cannot adjust to fit against seat.
Seat on right forced out of line by body distortion.

ABOVE—What happens before and after a taper seat gate valve is subjected to body distortion is shown in these somewhat exaggerated diagrams.

BEFORE AND AFTER

BELOW—How the Darling Fully Revolving Double Disc Parallel Seat gate valve continues to give positive closing despite body distortion.


Discs line up parallel with seats when valve is new.
Seat on right forced out of line by body distortion but disc adapts itself to give positive closing.
Curved face of wedge allows discs to adjust tightly against both seats.

ANY valve is tight on the drawing board, or on the assembly floor, but frequently a valve is installed with a pipe out of line, so that the valve body is subjected to unexpected "line strains."

Or expansion bends are not properly installed, so that the valve has to take the punishment of expanding and contracting lines.

The distortion of valve bodies is a continuous and almost microscopic process, but is one of the chief causes of leaking valves. Under the body blows of high temperature and pressure the valve bodies will change shape and valve seats will move out of their original line-up, preventing tight closing.

Over forty years ago Darling Valve & Manufacturing Company designed a valve that could take these body blows and still give positive closure. In the Darling Fully Revolving Double Disc Parallel Seat valve, there are two important features:

1. The floating discs are free to adapt themselves to change in the shape of the valve body, and to changed position of the valve seats.
2. The discs are fully revolving, seating in a different position each time, thus wearing evenly and always presenting a uniform surface against the valve seat. Even when worn thin the discs still furnish a positive seal.

Darling is the only valve which has this simple and efficient design. For "positive closing, year after year," thousands of experienced valve buyers specify Darling for all their tough jobs.

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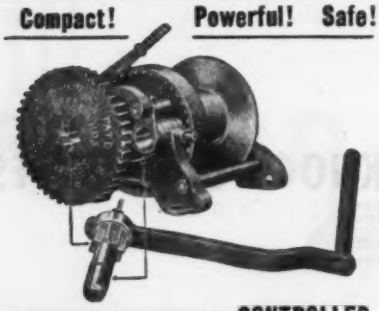

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PUBLIC BUILDINGS (Bids Asked, Cont'd.)

Bids Asked About June 21

†**N. J., New Brunswick**—New Brunswick Housing Auth., City Hall, 60 permanent family dwelling units, N. J. 22-1, for NHA. $300,000.

Bids Asked

†**Mass., Camp Edwards**—U. S. Eng., 31 St. James Ave., Boston, Zone 16, roofing bldgs., No. 19-023-45-Neg-137. $45,000.

LOW BIDDERS

N. C., Kinston—City, J. R. Sams, mayor and Bd. City Comrs., May 16, power plant imprvs., boiler, from Babcock & Wilcox Co., 85 Liberty St., New York, N. Y., $179,498. CD 4/25.

★†**S. D., Sioux Falls**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., May 22, constructing Main Bldg. 5, Veterans Hospital, from McGough Bros., 1945 University Ave., St. Paul, Minn., $1,260,000. CD 4/5—ENR 4/12.

†**Tenn., Smyrna** — Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta 3, Ga., sewage disposal plant, for war housing, from Dominion Engrg. Co., Hopewell, Va., $47,640.

Va., Richmond—City, City Hall, rebuilding 600,000 cu. ft. gas holder and installing outside purifying box at gas works, from Stacey Mfg. Co., Township and Big Four, Elmwood, Cincinnati, O., $75,740.

CONTRACTS AWARDED

★†**Calif., Hunters Point**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, 28 one story bldgs., providing 224 dwelling units, Calif. 4130, Area A, to Erborntraut & Summers, 446 6th St., San Francisco, $542,300. Kent & Hass, 525 Market St., San Francisco, archts. CD 5/15—ENR 5/17, under LB.

★†**Calif., Stockton**—Pub. Housing Auth., NHA, 760 Market St., San Francisco, 200 temporary family dwelling units, Calif. 4978; 23 bldgs. housing 76 men, Calif. 4979; 50 family trailer units, utilities, Calif. 4981, to Claude T. Lindsay, 824 Taraval St., San Francisco, $510,224. CD 4/30—ENR 5/3, under LB.

†**Kan., DeSoto**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., telephone bldg., automotive repair shop, gas stations, automotive paint shop, rest house, milling and inspection house, heater house, rework breaker roll houses, temperature house, wheeling walks and concrete loading pads, etc., Sunflower Ordnance Plant, to Peter Kiewit Sons Co., Omaha National Bank Bldg., Omaha, Neb., $186,140.

†**Kan., Fort Riley**—U. S. Eng., 10 E. 17 St., Kansas City 8, Mo., remodeling bldgs., erecting storage bldg., Contr. W-28-028-eng-825, to Mont J. Green & Co., Manhattan, $44,925.

★**N. Y., Sonyea** — Dpt. Mental Hygiene, State Office Bldg., Albany, female infirmary bldg. to Caristo Const. Corp., 26 Court St., Brooklyn, Zone 2, $533,000. Bids 4/4. CD 4/6—ENR 4/12, under LB.

★†**Pa., Indiantown Gap (br. Annville)**—U. S. Eng., Standard Oil Bldg., Baltimore, Army camp addnl. bldgs. to Lauter Constr. Co., 112 S. 16 St., Phila., Fred J. Brotherton, 185 Atlantic St., Hackensack, N. J., and Ritter Bros., 1511 N. Cameron St., Harrisburg. $685,600. Awarded 5/18.

†**Pa., York**—Blaw-Knox Co., D. E. Miller, divisional purch. agt., Rd. 5, ordnance plant, alterations, addns., for Navy Dpt., to Brown & Matthews, Inc., 122 E. 42 St., New York, N. Y., $458,960. Bids 5/3, awarded 5/11. CD 4/27.

†**Tex., Fort Sam Houston**—U. S. Eng., Fort Sam Houston, three 2 story, 30x130 ft., masonry, concrete guest houses, Ser. No. W-41-154-45-133, to R. P. Farnsworth & Co., Inc., P. O. Box 74, Houston, $200,388. Awarded 5/22. Barlett Cocke, 1504 Milam Bldg., San Antonio, and H. P. Smith, National Bank of Commerce Bldg., San Antonio, archts. F. T. Drought, 502 Frost Bank Bldg., San Antonio, engr. CD 3/23.

†**Tex., Texarkana**—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., change house and clock alley facilities, Contr. W-34-066-eng-346, Lone Star Ordnance Plant, to J. Sam Owens & L. Birdsong, Longview, $47,395.

★†**Wash., American Lake** — Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash. 25, D. C., 2 permanent bldgs., 2 addns., to MacDonald Building Co., 1517 South Tacoma Way, Tacoma, $1,403,435. (Correction—cost). CD 5/17—ENR 5/24, under CA.

★**B. C., Victoria**—Secy. Dpt. P. Wks., Ottawa, Ont., veterans hospital, to Northern Const. Co., and J. W. Stewart, Ltd., 736 Granville St., Vancouver, $863,300. Bids 3/19. CD 3/1—ENR 3/8.

COMMERCIAL BUILDINGS

PROPOSED WORK

Mass., West Springfield — Mittineague Methodist Church, Rev. H. F. Robbins, 18 Pleasant St., church. To exceed $150,000. Campaigning for funds.

Mich., Detroit—Mary Grove College, 8425 W. McNichols St., plans by D. A. Bohlen & Son, 930 State Life Bldg., Indianapolis, Ind., 4 story, 170x375 ft., stone, rein.-con., science bldg., also 3 wings. $250,000.

Mich., Detroit — Wayne-Michigan Bldg. Corp., C. H. Gershenson, pres., plans by Austin Engineers, Inc., 2842 W. Grand Blvd., 4 story, bsmnt., brick, steel, concrete office $200,000.

Mich., Grand Rapids—Calvin College and Seminary, 1331 Franklin St. S.E., plans by J. and G. Daverman & Co., Keeler Bldg., Grand Rapids and Malcolmson, Calder & Hammond, 1217 Griswold St., Detroit, 3 story, bsmnt., 60x200 ft., brick, concrete science bldg. $180,000.

Pa., Pottstown—Homeopathic Hospital, R. V. Hunter, chn. Bldg. Comm., Wilson and Burdans Dr., sketches by Eastern Engrg. Co., 126 N. 5 St., Reading, hospital alterations, addns. $175,000.

Tex., Corpus Christi—M. Vitemb, Horne Rd., 20 or more frame type dwellings, utilities. $150,000.

★**Tex., Houston**—C. O. Beeler & Associates, 1006 Evergreen Dr., 263 semi-fireproof dwellings, $2,000,000; water facilities and sanitary sewers for subdivision.

Tex., Houston—J. L. Keith, Jr., archt., 4513 Magnolia St., soon lets contract osteopathic hospital plant, for Houston Osteopathic Hospital. CD 4/20—ENR 4/26.

Alta., Calgary—Canadian Red Cross, Calgary, childrens hospital, 150 bed capacity on 8 acre site in Mount Royal Dist. $250,000.

Ontario—Canadian Red Cross Society, 311 Jarvis St., Toronto, plans by C. B. Dolphin, 53 Victoria St., Toronto, Red Cross Hospitals at New Liskeard, Rainy River, Nipigon and Sudbury. $200,000.

Que., Montreal—Bank of Canada, Wellington St., Ottawa, Ont., plans by Fetherstonbaugh & Durnford, 660 St. Catherine St. W., Montreal, and C. D. Sutherland, c/o Dpt. P. Wks., Ottawa, Ont., 2 story bank, Victoria Square and Craig St. W. About $400,000.

Que., Montreal—H & T Charney, 5126 Park Ave., dwellings, $150,000.

Que., Montreal—W. J. Colle, 5145 Victoria Ave., 3 story, brick apartment, concrete fdn. $150,000.

Que., Quebec City—Eveche de Quebec, 1 Port Dauphin St., church, St. Valliers St. $200,000.

Que., Quebec City—Archdiocese of Quebec, The Palace, Quebec City, church, St. Valier St. $200,000.

Que., Verdun — Roman Catholic School Comn., Verdun, plans by M. Bertrand, 104 W. Craig St., Montreal, school, Richard Ave. $150,000. CD 5/7—ENR 5/22.

Sask., Regina—Grey Nuns Hospital, Regina, 5 story hospital wing, housing Saskatchewan Govts. laboratory division. Over $300,000.

BIDS ASKED

Bids Asked June 8

Calif., San Francisco—Pacific Telephone & Telegraph Co., 140 New Montgomery St., New Montrose telephone exchange bldg. H. A. Thomsen, Jr., 315 Montgomery St., archt.

CONTRACTS AWARDED

Calif., Oakland—Bay Counties Home, 1 Hillcrest Blvd., Millbrae, forty-four 1 story frame residences, Capistrana Dr. and Almanza Dr., to Schultz Constr. Co., 1 Hillcrest Bldv., Millbrae. Est. over $150,000.

Tex., San Antonio—M. Kallison, 124 E. Flores St., converting 8 story office bldg. into apartment hotel. Owner builds. $150,000. CD 5/9—ENR 5/11.

Ont., Hamilton—Holy Family Separate School, A. E. Ford, secy., c/o Hutton & Lauter, archts., 36 James St., 8 room school addn., Kenilworth and Brittania Sts., to W. H. Yates Constr. Co., Ltd., 400 Wellington St. N., about $180,000.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ind., Fort Wayne — FOUNDRY — Kunkle Brass & Aluminum Foundry Co., L. A. Fox, pres., 121 S. Clinton St., 200x500 ft. and 30x140 ft., steel, concrete foundry bldgs. on 8¼ acre site north of Penn R.R. and west of Winter St.

Ind., Franklin — PLANT — Noblett-Sparks Co., Inc., Columbus, making plans 1 story, brick, rein.-con., structural steel mfg. plant addn. $75,000-$100,000.

★**Ind., South Bend**—PLANT—Studebaker Corp., South Bend, 2 story, 100x700 ft. plant. $1,500,000.

Mich., Detroit—WAREHOUSE, etc.—M. B. De Keyser Co., 2533 Hilger Ave., 2 story, brick, steel, concrete warehouse, office and showroom. $150,000.

Mo., St. Louis—BAKERY—J. B. Carr Biscuit Co., 4956 Natural Bridge Ave., Zone 14, plans by Mauran, Russell, Crowell & Mullgardt, 1620 Chemical Bldg., 8 and Olive Sts., Zone 1, 1 story bakery plant and office bldg., 4400 S. Kingshighway Blvd. Over $40,000 with equip.

Mo., St. Louis—FACTORY, etc.—General Engineering & Mfg. Co., 1523 S. 10 St., Zone 4, plans by W. C. Wallace, engr. and archt., c/o owner, 1 story, 240x280 ft. factory and 2 story, 70x160 ft. office bldg., brick, concrete, steel, etc., on 3400 block of Maury Ave. Over $400,000 with equip.

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INDUSTRIAL BUILDINGS (Proposed Work Cont'd.)

Mo., St. Louis—MANUFACTURING, etc.—Owner, c/o G. C. Dischert, 4050 Shreve Ave., Zone 15, 1 story, brick, concrete manufacturing and warehouse bldg., 4417-21 Clayton Ave. Over $250,000 with equip.

O., Dayton — LABORATORY — Chrysler Corp., 1119 Leo St., 1 story, 75x140 ft., brick, steel engineering laboratory addn., compressors, refrigeration equip., $128,920.

O., Newark—FACTORY—Pharis Tire & Rubber Co., 265 W. Main St., truck tire plant addn. $250,000.

O., Troy—FACTORY—Hobart Mfg. Co. Pennsylvania Ave., 3 story, brick, rein.-con. factory. $240,000.

O., Youngstown—PLANT—Coca-Cola Bottling Co., 669 Wick Ave., district distributing plant on 5 acre site fronting South Marmion Sts. and E. Indianola Ave. $250,000

Ore., Drain—SAWMILL—E. Whipple & Son, Drain, rebuilding sawmill destroyed by fire. $50,000.

Ore., Hood River—PLANT—Apple Growers Ass'n., Hood River, apple packing plant, 1 and Cascade Sts., Oak Grove, near here $60,400.

Ore., Oak Grove—PLANT—Apple Growers Assn., Oak Grove, plans by F. H. Fassett, Yakima, Wash., 1 story, 65x200 ft. packing plant, $60,400. J. E. Klahre, Oak Grove, engr.

Ore., Portland—FACTORY—O. J. Loughead & Son, 303 S.E. Union Ave., saw mfg. plant, 60 and Lumbard Sts. $45,000.

Ore., Portland—PLANT—Pacific Supply Co-Operative, 801 S.E. Division Pl., plans by Whitehouse, Church, Newberry & Roehr, Railway Exchange Bldg., 1 and 2 story, 200x200 ft., and 60x100 ft. fertilizer processing plant, rein.-con., N.W. 19 and Upshur Sts. $83,877. CD 5/16—ENR 5/24.

Ore., Reedsport — FACTORY — Reedsport Creamery & Cheese Factory, Reedsport, cheese factory. $50,000.

Pa., Churchtown—PLANT—H. K. Stoltzfus, Churchtown, repairing quarry plant $50,000.

Pa., Phila.—GARAGE—R. Hawthorne, 1701 N. 2 St., preparing plans garage addn. $40,000 or more.

R. I., Providence—PLANT—General Products Corp., 1144 Eddy St., brick, plant addn. for garage and loading facilities. $40,000. Howe & Prout, 1016 Turks Head Bldg. engrs.

Tex., Edinburg—PLANT—Edinburg Canning Co., Edinburg, 1 and 2 story, brick, rein.-con. processing plant. $40,000.

Tex., Houston—LUMBER YARD—Dincans Lumber Co., 2610 Bissonnet St., plans by H. Moore, 2008 W. Alabama St., lumber yard $40,000.

Tex., McAllen—PLANT—Reagan Canning Co., McAllen, 1 and 2 story, brick, concrete processing plant. $40,000.

Wash., Washougal — PLANT — Columbia Flax Assn., Camas, altering flax plant. $55,000.

Wis., Marinette—GARAGE—T. A. Handley, Menominee, Mich., plans by D. M. Schoepke, 1529 Elizabeth Ave., 1 story, 72x90 ft., rein.-con., steel beams and columns concrete block garage, concrete fdn.

Wis., Wisconsin Rapids—WAREHOUSE—Prentiss-Wabers Products Co., 3 St. N., 1 high story, 125x300 ft., brick, steel, rein.-con. warehouse addn. $100,000. Plans deposit $25. A. F. Billmeyer & Son, 172 2 St. N. archt. CD 3/14—ENR 3/22.

Alta., Lethbridge—REFINERY—Pacific Oil Refinery Co., Ltd., Lethbridge, refinery addn. and cracking plant. $100,000.

B. C., Kamloops — PLANT — Campbell Creek Hop Plantation Syndicate, 1445 Powell St., Vancouver, bldg., and installing equip. About $76,100.

B. C., Vancouver—FACTORY—Dominion Rustproof Co., Ltd., 1590 Powell St., factory, Renfrew and 10 Sts. $250,000.

B. C., Vancouver—PLANT—The Golden Kist Mfg. Co. Ltd., 3220 Heather St., plant. Grandview and Renfrew Sts., $45,000. Site purchased.

Man., Winnipeg—PLANT—Dominion Malting Co. Ltd., 412 Grain Exchange Bldg., plant addns., incl. addnl. 1,150,000 bu. malting cap. and constructing storage facilities, 600,000 bu. cap. $100,000.

Man., Winnipeg—PLANT—Simmons Mfg. Co., Gomez and Sutherland Sts., plant reconstruction. $40,000.

N. W. T., Yellowknife—DIAMOND DRILLING—Belle Bry Mine Ltd., 706 W. Adelaide St., Toronto, Ont., diamond drilling. $86,000

N. S., Halifax—PLANT—Maritime-National Fish, Ltd., Lower Water St., plant addn. equip. About $103,000.

N. S., Kentville—PLANT—Canada Food Ltd., 569 Main St., plant addn. $40,000.

Ont., Collingwood—PLANT—Collingwood District Co-Operative, Inc., Collingwood, cereals, fruits, vegetables, etc. processing plant. $40,000.

Ont., Etobicoke—FACTORY—Swift Canadian Co., Ltd., 1960 St. Clair Ave., Toronto, factory. $65,000.

Ont., Guleph—PLANT—The Canada Ingot Iron Co., Ltd., Guleph, plant addn. $40,000

Ont., Haileybury—PLANT—N. Morissette Diamond Drilling, Ltd., Main St., plans by Ross Brisley, Whitwood Ave., New Liskeard. 50x112 ft., concrete block walls, steel frame plant exten., concrete fdn. $45,000.

INDUSTRIAL BUILDINGS (Proposed Work, Cont'd.)

Ont., Leaside (Toronto Postal Dist.)—FACTORY—Curtis Lighting of Canada, Ltd., 549 W. Richmond St., Toronto, factory. $50,000.

Ont., MacKenzie Island—MINING DEVELOPMENT—Heath Mines, Ltd., 357 Bay St., Toronto, mining development. $130,000.

Ont., Merrickville — PLANT — Grenville Castings, Ltd., Merrickville, plant. $40,000.

Ont., Midland — PLANT — Sydney Caplan Toronto, Ltd., Midland, plant. $40,000.

Ont., Mimico (Postal Dist. Toronto)—FACTORY—British Drug Houses Canada, Ltd., Queen Elizabeth Hy., Mimico, factory. $50,000.

Ont., Niagara Falls—FACTORY—International Silver So., 263 River Rd., plans by N. Mann, 1095 Franklin St., 1 story, 40x80 ft. and 17x65 ft., brick, steel factory addns. $50,000.

Ont., North Bay—PLANT—Aretic Frozen Foods, Ltd., W. E. Cuff, secy., c/o North Bay Bd. Trade, North Bay, 50x66 ft., cinder block, stucco finish freezing plant, incl. locker rooms, cold storage rooms, egg grading station, blueberry fast freezing plant, Oak St. Over $40,000.

Ont., Prescott—PLANT—Newell Mfg. Co. Ltd., G. B. Jenkinson, mgr., King St., 2 story, 100x100 ft. plant addn. $90,000.

Ont., Red Lake—MINE DEVELOPMENT—Advance Red Lake Mines, Ltd., 345 Bay St., Toronto, mine development. $125,000.

Ont., Sault Ste. Marie—PLANT—Algoma Lumber & Tie Co., Sault Ste. Marie, plant extens. $40,000.

Ont., Simcoe — PLANT — Pioneer Stoker Products Ltd., Simcoe, stokers, heating equip. etc. mfg. plant. $4,000.

Ont., Toronto—FACTORY—N. A. Armstrong, archt., 19 Melinda St., soon lets contract 2 story, 40x200 ft., concrete, brick, steel factory, Pharmacy Ave., for Fine Chemicals of Canada Ltd., 587 Fleet St. W. About $135,000. CD 5/3—ENR 5/24.

Ont., Toronto — FACTORY — Dominion Bridge Co., Ltd., 1139 Shaw St., making plans factory, Industry St. in North York Twp. $2,000,000.

Ont., Toronto—FACTORY—Dalgiish Products Ltd., 140 Liberty St., factory. $40,000.

Ont., Toronto—REPAIR SHOP—Godsall & Co., Ltd., 435 Keating St., plans by Adamson & Morgan, 3 St. Thomas St., 1 story, brick, steel repair shop. About $50,000.

Ont., Toronto—FACTORY—Hunt's Limited, 69-71 Walker Ave., plans by S. Comber, 1562 St. Catherine St. W., Montreal, Que., 2 story, bsmnt., 50x150 ft., brick, steel, factory exten. $100,000.

Ont., Toronto—PLANT—Harold Jeffery Automotive Products, Ltd., c/o M. M. Herman, K. C., 414 Bay St., carburetors, accessories, etc. mfg. plant. $40,000.

Ont., Toronto—FACTORY—Keiner & Co. Canada, Ltd., 52 Dickens St., leather finishes, etc., factory, Trent Ave. $50,000. Site purchased.

Ont., Toronto—KNITTING FACTORY—Koenig Knitting Mills, Ltd., 628 King St. W., plans by S. B. Coon & Son, 4 St. Thomas St., 1 story, 120x200 ft. knitting factory, brick or concrete, 1179 Bathurst St. $75,000. CD 5/18.

Ont., Toronto — FACTORY — Manton Brothers, Ltd., 105 Elizabeth St., factory, Elizabeth St. and Foster Pl., and 1 story bldg. addn. About $55,000.

Ont., Toronto—PLANT—Martin Electric, Ltd., 624 W. King St., plant, Merton St. $50,000. Site purchased.

Ont., Toronto—FACTORY—Swift Canadian Co., Ltd., 1960 St. Clair Ave. W., factory and installing equip. in Etobicoke Twp. $140,000.

Ont., Toronto—PLANT—Universal Plywood Trim Ltd., c/o W. H. Bourdon, K. C., 3431 W. Dundas St., wood products, etc. plant. $40,000.

Ont., Toronto—FACTORY—Wall Chemicals Canadian Corp., Ltd., 1103 Millwood Rd., factory. $125,000.

Ont., Wallaceburg—PLANT—H. J. Heinz Co. of Canada, Ltd., Erie St. N., plant alterations. $287,160.

Ont., Waterloo—FACTORY—Ontario Die Co. Ltd., 88 King St., J. M. Levene, mgr., 18 King St., factory. $45,000. E. Wright, c/o owner, engr. CD 1/25—ENR 5/10.

Ont., Windsor—PLANT—Threading Specialties, Ltd., c/o C. J. Clark, K. C., Windsor, mfg. plant. $40,000.

Ont., Winona—PLANT—E. D. Smith & Son, Ltd., Winona, jams, jellies, fruits, etc. plant addn. $50,000.

Que., Baieville (Post Office via Yamaska)—PLANT—Cooperative de La Baie, Baieville, vegetables, etc. processing plant. $40,000.

Que., Bourlamaque — DIAMOND DRILLING—Orenada Gold Mines, Ltd., 357 Bay St., Toronto, Ont., diamond drilling. $48,500. J. P. Norrie, Ames, engr.

Que., Joliette — PLANT — Lamont Alloy Foundry, Ltd., Joliette, 80x134x134 ft., steel, brick plant. Over $50,000.

Que., LaTuque — PLANT — Brown Corp., LaTuque, steel supports and equip. $110,000.

Que., Louiveourt—DIAMOND DRILLING—Bevcourt Mines, Ltd., 1700 36 W. St. James St., Montreal, diamond drilling. $51,400.

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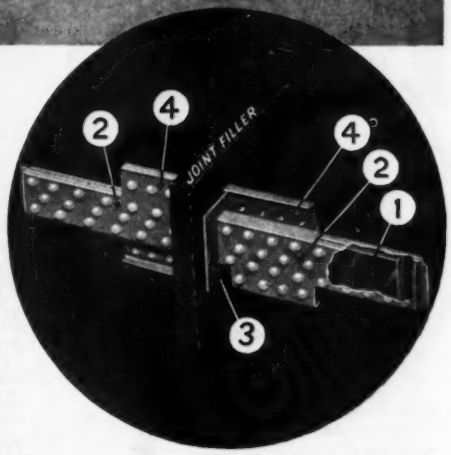

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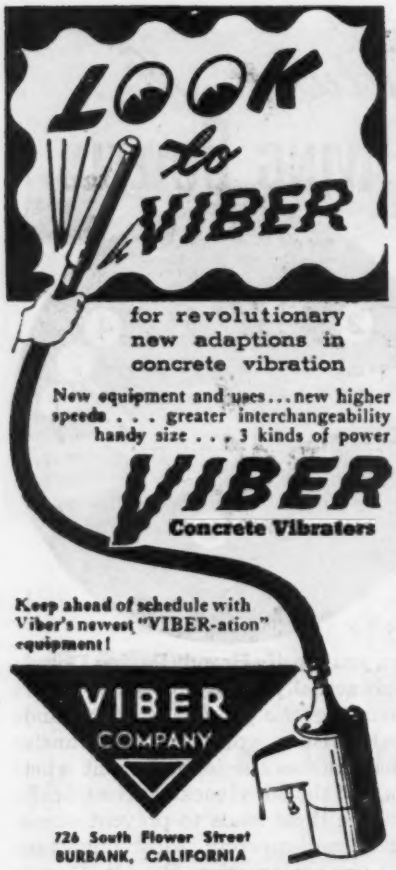
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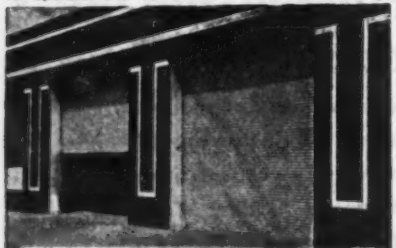

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INDUSTRIAL BUILDINGS (Proposed Work, Cont'd.)

Que., McWatters—DIAMOND DRILLING—Hosco Mines, Ltd., 357 Bay St., Toronto, Ont., diamond drilling. $93,000.

Que., Montreal—FACTORY—G. Bultz, 5865 Park Ave., plans by R. Fisher, 784 Wiseman Ave., factory. $40,000.

Que., Montreal — PLANT — Pilkington Brothers Canada, Ltd., 929 Bushy Lane, plant addn. $40,000.

Que., Montreal—PLANT—Royce Shoe Co., Ltd., c/o H. Batshaw, 276 W. St. James St., plant mfg. boots, shoes, footwear, etc. $40,000.

Que., Noranda—DIAMOND DRILLING—Elder Mines, Ltd., 11 W. King St., Toronto, Ont., diamond drilling. $52,677.

Que., Rouyn—MINING DEVELOPMENT—Anglo-Rouyn, Ltd., 100 W. Adelaide St., Toronto, Ont., mining development. $60,000.

Que., St. Edouard de Frampton (P. O. Frampton) — PLANT — Societe Cooperative Agricole de Frampton, St. Edouard de Frampton, fruits, vegetables, etc. processing plant.

Que., Verdun—FACTORY—Textile Colouring, Inc., 3128 La Salle Blvd., I. Crossman, mgr., 100x150 ft. factory. $75,000.

Sask., Regina—REPAIR—Canadian Pacific Ry. Co., J. E. Armstrong, ch. engr., Windsor Station, Montreal 3, Que., car repair bldg. $50,000.

Sask., Swift Current—FACTORY—W. J. McIntyre, Swift Current, factory addn. $40,000.

BIDS ASKED

Conn., New Haven—TRUCK TERMINAL—Rapid Motor Lines, Inc., 240 Putnam St., concrete, steel truck terminal, incl. repair shop, Kendall St. $70,000. L. F. Caproni, 1221 Chapel St., engr. CD 5/16—ENR 5/24.

Conn., Plainfield — FACTORY — Plastic Film Corp., c/o L. F. Caproni, archt., 1221 Chapel St., New Haven, 1 story, 42x200 ft., brick, steel, concrete factory, 4 silos and 30x100 ft. platform. $45,000. CD 5/16—ENR 5/24.

Ill., Chicago—FACTORY—E. J. Bahe & Co., 2334 W. Nelson St., 2 story, 50x125 ft., brick, factory addn. E. E. Reddersen & Assoc., 703 Buena Ave., archts.

Ill., Woodstock—FACTORY—Alemite Co., 528 Erie St., Toledo, O., 2 stor brick, concrete, steel factory addn. $150,000.

Md., Elkton—PLANT BLDGS—Triumph Explosives, Inc., Elkton, palletizing project, from Rupert Constr. Co., 1509 French St., Wilmington, Del. $59,777. Bids 4/4 rejected. CD 4/12—ENR 4/19, under I.B.

Tex., Dallas—INSPECTION—Dallas Railway & Terminal Co., Elm and Peak Sts., 1 story, bamnt., 80x108 ft., structural steel, brick, rein.-con., etc inspection bldg. Over $40,000. G. Gill, Great National Life Bldg., archt. R. L. Rolfe, Thomas Bldg., structural engr. Zumwalt & Vinther, Merc. Bank Bldg., mechanical engrs.

CONTRACTS AWARDED

Conn., New Britain—BUS TERMINAL—Connecticut Railway & Lighting Co., 38 Chestnut St., remodeling, imprv. office and maintenance facilities, bus terminal, Chestnut St. to Dwight Building Co., 152 Temple St., New Haven. Est. $40,000. Westcott & Mapes, Inc., 109 Church St., New Haven, engrs.

Conn., Norwalk — FACTORY — W. Tait, Crooked Mile Rd., Westport, brick, steel factory-laboratory, Newtown Ave., to W. J. Lyons, Rhodondolia Ave. Est. $50,000.

Del., Wilmington—PLANT—Electric Hose & Rubber Co., 12 and Dure Sts., 2 story, 150x300 ft. mfg. plant addn., to John E. Healy & Sons, Inc., 707 Tatnall St., approx. $100,000. Awarded 5/10. Robinson, Stanhope & Manning, Inc., Equitable Trust Bldg., 9 and Market Sts., archts.

Ill., Chicago — FACTORY — Webster-Chicago Corp., 5622 W. Bloomingdale St., 3 story, brick, concrete, steel factory, to Campbell-Lowrie-Lautermilch, 400 W. Madison St., about $300,000. C. A. Metz, 224 S. Michigan Ave., consult. engr.

Ia., Muscatine—WAREHOUSE, etc.—Skidmore, Owings & Merrill, archts., 100 W. Monroe St., Chicago, Ill., warehouse and factory, for H. J. Heinz Co., 1062 Progress St. N.W., Pittsburgh, Pa., to J. H. Hunzinger, Security Bldg., Davenport, approx. $200,000. Bids 5/2. CD 4/27—ENR 5/10.

Mass., Worcester—STORAGE, etc.—Osgood Bradley Div. Pullman Standard Car Mfg. Co., 8 Grafton St., rebuilding, brick storage and office bldg., to Sumner S. Sollitt Co., 307 Michigan Ave., Chicago, Ill. Est. $40,000.

O., Toronto—PLANT—Hancock Mfg. Co., Toronto, 1 story vitrified products mfg. plant, brick, concrete, steel, to Guy Johnson Contg. Co., Steubenville. $40,000. Awarded 5/15.

Ore., Dillard—SAWMILL—Roseburg Lumber Co., Roseburg, frame sawmill, day labor. $98,500. J. R. Jorgensen, Cottage Grove, engr.

Ore., Klamath Falls—FUEL HOUSE, etc.—Weyerhaeuser Timber & Sales Co., Longview, Wash., hog fuel house and conveyor sys. addns., day labor. $53,919. CD 3/28—ENR 4/5.

Ore., Portland—COLD STORAGE—Northwest Poultry Co., 232 S.E. Oak St., 2 story, 75 x 102 ft. cold storage and processing addn., to A. B. Taylor, 3245 N.E. 41 St. $52,000. Awarded 5/22. Dougan & Helms, 611 Henry Bldg., archts.

Ore., Portland—WAREHOUSE, etc.—Amco Inc., c/o R. Sundeleaf, archt., Spalding Bldg., 2 story, bamnt., warehouse, office and showroom bldg., N.W. Everett between 13 and 14 Aves., to Wegman & Son, Bd. of Trade Bldg. Est. $147,000.

Pa., Phila. — MANUFACTURING — J. G. Brill Co., 62 St. and Woodland Ave., mfg. bldg. addn., to C. H. Schwertner, 1139 Hamilton St. Est. $40,000 or more. Awarded 5/8.

Pa., Phila.—MILL—James Bromiley Estate, Leighton Dorey, in charge, Leiper and Adams Ave., rebuilding textile mill, to Frank G. English & Sons, 1606 N. Carlisle St. Est. approx. $40,000. Awarded 5/17. E. A. Stopper, 2112 Spruce St., archt.

Pa., Phila. — TERMINAL — Reading Co., E. Y. Allen, ch. engr., Reading Terminal Zone 1, terminal alterations, to Irwin & Leighton, 1505 Race St., $86,700. Awarded 5/18.

Wash., Elberton—GRAIN ELEVATOR—Glenwood Farmers' Warehouse, Inc., Elberton, 154,000 bu. grain elevator, concrete, to L. Delivuk, E. 711 Illinois St., Spokane. Est. $80,000.

Wis., Algoma—POWER PLANT—Algoma Plywood & Veneer Co., Algoma, 1 story, 62x88 ft., brick, steel power plant for three 500 hp.-200 lb. boilers, concrete fdn., to McManama & Co., 709 Arctic Bldg., Seattle, Wash. Est. $210,000 incl. equip. G. L. Cadenhead, Algoma, engr. CD 10/31—ENR 11/1.

★**Wis., Beloit**—PLANT—Wisconsin Power & Light Co., 122 W. Washington St. Madison, 1 story, 76x118 ft., brick, steel, rein.-con. generating plant addn., to Cunningham Bros., 359 E. Grand Ave. Est. $3,000,000, incl equip. CD 5/15—ENR 5/17.

Wis., Kenosha—FACTORY—Nash-Kelvinator Corp., 5626 25 Ave., 1 story, 200x250 ft., steel, brick, factory addn., concrete fdn., to Permanent Const. Co., 4100 W. 1 St., Milwaukee, Zone 12. Est. $165,000. Giffels & Vallet, Inc., 100 Marquette Bldg., Detroit Mich., archts.

Wis., Oshkosh—FACTORY—Buckstaff Co., S. Main St., 1 story, 78x95 ft., brick, steel factory addn., concrete fdn., to Fluor Bros. Const. Co., 44 Otter St.

Wis., Racine—STORAGE—Belle City Malleable Iron Co., 1442 Forest St., 1 story, 88x120 ft., concrete block pattern storage bldg., concrete fdn., to Nelson & Co. Inc., 1550 Yant St. E. A. Klinger, 612 14 St., archt.

Alta., Lethbridge — BAKERY — McGavin Bakeries, Ltd., 2106 W. Bway., Vancouver, B. C., bakery, 3 Ave. and 15 St., to Bennett & White Const. Co. Ltd., 510 W. Hastings St., Vancouver, B. C. $53,000. CD 12/13—ENR 12/28.

B. C., Penticton—WAREHOUSE—Penticton Co-operative Growers, Lakeshore Dr., new warehouse or storehouse, bldg. addn. to installing equip. to Bennett & White Const. Co. Ltd., 510 W. Hastings St., Vancouver, about $86,500. CD 3/1, 4/13—ENR 3/15, 4/19.

B. C., Vancouver—WAREHOUSE, etc.—Canadian Marconi, 500 Beatty St., warehouse and office, 500 Block Burrard, to Armstrong & Monteith Const. Co. Ltd., 1289 Hornby St., $61,200.

Ont., Brockville—PLANT—Phillips Electrical Works, Ltd., Kingston Rd., plant exten., to D. M. Ross, 117 King St. E., about $85,000. J. C. Day, 1502 Catherine St. W. Montreal, engr. CD 4/17—ENR 4/19.

Ont., Fort William—PLANT—Great Lakes Paper Co., Ltd., Fort William, 2 bldg. addns. installing equip., etc. to Clayton & Co. Ltd., 16 Victoria Block, $307,635. CD 1/16—ENR 1/18.

Ont., Hamilton—WAREHOUSE—Steel Co. of Canada, Ltd., Wilcox St., warehouse, Lilcox Lane, to Pigott Constr. Co., Ltd., Pigott Bldg., about $125,000. CD 5/16—ENR 4/5.

★**Ont., St. Thomas** — PLANT — Timken Roller Bearing Co., 1835 Dueber Ave. S., Canton, O., U. S. A., plant, to Dinsmore & McIntire, Ltd., 903 Security Bldg., Windsor, about $600,000. Bids 5/9. CD 4/10—ENR 5/3.

Ont., Toronto—PLANT—Eli Lilly & Co. Ltd., Inc., Terminal Warehouse Bldg., plant. Danforth and Blackmont Aves., to Anglin-Norcross, Ontario, Ltd., 57 Bloor St. W., about $140,000. CD 1/25—ENR 2/8.

Que., Sherbrooke—PLANT—Panther Rubber Mfg. Co. Ltd., 29 Jenckes Lane, 2 story, 40x140 ft. plant addn., to Stewart Const. Co. Ltd., 7 Dufferin St., about $50,000. CD 2/15—ENR 3/1.

UNCLASSIFIED

PROPOSED WORK

★**†Calif., Oakland**—AUTOMATIC SPRINKLER SYSTEM EQUIPMENT—U. S. Eng., 74 New Montgomery St., San Francisco, Zone 19, automatic sprinkler sys. equip. in 7 large warehouses and shop bldg., at Oakland Army Base, $527,800.

★**†Fla., MacDill Field**—PARKING APRON, etc.—U. S. Eng., Post Office Bldg., Savannah, Ga., reconstructing parking apron, addnl. parking apron, new northwest-southeast runway, reconstructing portion northwest-southeast runway for use as taxiway, reconstructing east-west runway for use as taxiway, warm-up pad, approx. 300 ft. x 300 ft., necessary night lighting and railroad spur exten. $4,200,000.

NCLASSIFIED (Proposed Work, Cont'd.)

Mass., Brimfield—SWIMMING POOL—Springfield Boys' Club, 260 Chestnut St., Springfield, soon lets contract 42 x 100 ft. concrete swimming pool. McClintock & Craig, Inc., 458 Bridge St., Springfield, engr. CD 5/18—ENR 5/24.

Mich., Detroit—STADIUM—Arcadia Boxing Club, 3527 Woodward Ave., concrete, timber outdoor stadium 5,000 people capacity. $75,000.

†**Miss., Gulfport**—AIRFIELD—U. S. Eng., 1 Grant St. west of Westwood St., Mobile 7, Ala., reconstructing apron, taxiways, northwest-southeast and northeast-southwest runways, new parking apron, modification night lighting sys., Gulfport Army Airfield. $4,000,000.

Missouri—RURAL ELECTRIC LINES—Crawford Electric Cooperative, Bourbon, 407 mi. addn. rural electric lines serving 1020 customers, Crawford Co. $212,000 REA allot.

Missouri—RURAL ELECTRIC LINES—Grundy Electric Cooperative, Trenton, about 211 mi. addnl. rural electric lines serving 949 customers, Grundy Co. $200,000. REA.

Missouri—RURAL ELECTRIC LINES—West-Central Electric Cooperative, Higginsville, 94 addnl. mi. rural electric lines, serving 228 customers, Lafayette Co. $100,000 REA allot.

Oklahoma—PIPELINE—Warren Petroleum Co. Natl. Bank of Tulsa Bldg., Tulsa, high pressure natural gas pipeline from gas field near Cumberland to carbon black plant of Chas. E. Johnson Co., near Stonewall. $100,000.

†**Tex., Bryan** — HIGH-TENSITY APPROACH AND RUNWAY LIGHTS—U. S. Eng., 606 Santa Fe Bldg., Galveston, high-intensity approach and runway lights at Bryan Army Airfield, $34,200.

†**Tex., Harlingen**—PARKING APRONS—U. S. Eng., 606 Santa Fe Bldg., Galveston. Bids soon parking aprons and exten. watermain at Harlingen Army Airfield. $43,200.

Tex., Houston — FERRY LANDINGS — Comrs. Harris Co., Court House, ferry landings at Lynchburg Ferry. Over $25,000. Fitch & Elliott, 421 Union National Bank Bldg., engrs.

†**Tex., Houston**—PARKING AREAS, etc.—Reconstruction Finance Corp., Rusk Bldg., asphalt paving parking areas and loading docks. $25,000. R. J. Cummins, Bankers Mortgage Bldg., engr.

†**Tex., Kelly Field**—AIRFIELD BLDGS—U. S. Eng., Fort Sam Houston, rehabilitation and deferred maintenance existing bldgs., $150,000. D. McNair, Bldg. 73, archt.

★†**Tex., Randolph Field**—RUNWAYS, etc.—U. S. Eng., Fort Sam Houston, 1 north northeast-south southwest runway, 2 connecting taxiways, reconstructing parking aprons, installing night lighting, correcting storm drainage deficiencies. $3,836,000.

Tex., Rockport—PIER—Jno. E. Harvey, Rockport, 700 ft. pier, 4 ft. wide, 10x30 ft. "T" head, etc. into Aransas Bay, over $40,000.

†**Tex., Waco** — ELECTRICAL UNDERGROUND CABLE SYSTEM—U. S. Eng., Fort Sam Houston, electrical underground cable sys., at McCloskey Hospital Annex. Spec. No. W-41-154-45-103. Over $25,000.

Wash., South Wenatchee—SPUR TRACK—Great Northern Ry. Co., C. M. Nye, ch. engr., 175 E. 4 St., St. Paul 1, Minn., 2,480 ft. spur track exten., at Appleyard. $28,100.

†**W. Va., Clarksburg**—AIRPORT GRADING—Civil Aeronautics Admin., 385 Madison Ave., New York 17, N. Y., rejected bids May 7, grading at Benedum Airport. CD 4/30.

B. C., Nanaimo—WHARF—Canadian Fishing Co., Ltd., Nanaimo, wharf exten., etc. $35,000.

N. S., Halifax—WHARF—Municipality, reconstructing South Wharf. $25,000. D. R. Smith, City Hall, dir. Wks. and engr.

Que., Granby—BROADCASTING STATION—LaCompagnie de Radio Diffusion de Granby, Ltd., c/o J. O. Biron, Granby, broadcasting station, $90,000.

★**Saskatchewan**—GAS PIPELINE—Community Services, Ltd., Saskatoon, 80 mi. 6 in. natural gas pipeline from vicinity of Lloydminster Field to North Battleford. $1,500,000.

BIDS ASKED

Bids Asked After June 1

★†**Tex., Camp Normoyle**—ENCLOSING OPEN SHEDS—U. S. Eng., Fort Sam Houston, enclosing open sheds in storage and shop area, Serial W-41-154145-157. $610,-192. CD 5/15—ENR 5/24.

Bids Asked June 7

†**Mass., North Andover**—AIRPORT—Civil Aeronautics Admin., 385 Madison Ave., New York, N. Y., night lighting series sys., Municipal Airport, Prop. 1-45-570.

Bids Asked June 11

†**Fla., Eglin Field (br. Crestview)**—CLIMATIC HANGAR—U. S. Eng., Grant St. west of Westwood St., Mobile, 7, Ala., installing instrumentation of climatic hangar. Ser. No. 01-076-45-363.

Bids Asked June 12

N. Y., Sloatsburg—ATHLETIC FIELD GRADING—Bd. Educ., Central School Dist. 1, Ramapo, grading, school athletic field.

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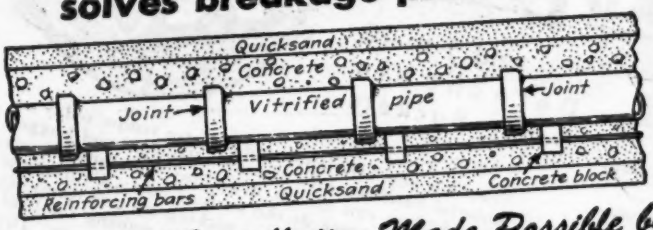

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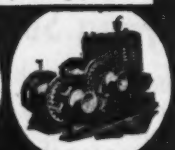

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UNCLASSIFIED (Bids Asked, Cont'd.)

Bids Asked

†**Tex., Harlingen**—GUNNERY RANGE—U. S. Eng., 606 Santa Fe Bldg., Galveston, air-to-ground gunnery range on Padre Island sub-base. Ser. No. W-41-343-eng-45-mi-37 Over $75,000. CD 1/17—ENR 1/25.

†**Tex., Kelly Field**—SPRINKLING SYSTEM—U. S. Eng., Fort Sam Houston, sprinkling sys. in miscellaneous bldgs. Area Group D Ser. No. W-41-154-45-150.

LOW BIDDERS

†**La., Camp Polk (br. Leesville)**—CABLE SYSTEM—U. S. Eng., 606 Santa Fe Bldg. Galveston, Tex., nurses alarm and signalling sys., Inv. W-41-243-eng-MI-24, from G. G Hinote Electric Co., 1493 College St., Beaumont, Tex., $25,178. CD 5/4—ENR 5/10.

†**La., Alexandria**—SONIC BOMB SCORING TARGETS—U. S. Eng., 300 Little Rock Ark., May 16, sonic bomb scoring targets for Army Airfield, from Levasseur & Allen Shreveport, $41,006.

†**Mont., Cut Bank**—AIRFIELD BLDGS.—U. S. Eng., 1400 Textile Tower Bldg., Seattle 1, Wash., May 18, dismantling, demolition, removal government-owned bldgs., facilities at airfield, Neg. 1134, from B. H. Sheldon, S. 1604 Winona Blvd., Spokane, Wash. $29,350. CD 5/10.

†**Tex., Camp Swift**—SIGNALING SYSTEM—U. S. Eng., 606 Santa Fe Bldg., Galveston, nurses signaling sys. in hospital bldgs., Serial W-41-243-Eng-45-M1-22, from O. H. Cummings Electric Co., 303 E. 7 St., Austin. $25,540.

CONTRACTS AWARDED

†**Alabama** — AUTOMATIC SPRINKLER SYSTEM — U. S. Eng., Grant St. west of Westwood St., Mobile, Zone 7, automatic sprinkler sys. in Warehouses 1, 2, 3, 4, 5 and 6, at Montgomery Holding Reconsignment Point Depot, Montgomery Co., Inv. 01-076-45-272, to Evans & Hailey, Inc., 1620 West End Ave., Nashville, Tenn., $304,406. Bids 5/11.

†**Ala., Anniston**—AMMUNITION SHEDS—U. S. Eng., Grant St. west of Westwood St. Mobile, Zone 7, ammunition sheds, Anniston Ordnance Depot, Contr. W-01-076-eng-1037, to Butler & Cobbs, Montgomery. $67,-456.

★†**Ala., Maxwell Field (sta. Montgomery)** — APRON PAVEMENT — U. S. Eng., Grant St. west of Westwood St., Mobile, Zone 7, addnl. reinforcement and reconstruction apron pavement 436,535 sq. yd., Inv. 01-076-45-343, to John F. Bloomer Co. & Joseph D. Bonness, Inc., 1409 N. 27 St. Milwaukee, Wis., $925,199. Bids 5/17. CD 5/11.

★†**Ala., Maxwell Field (Sta. Montgomery)** —RUNWAYS, etc.—U. S. Eng., Grant St. west of Westwood St., Mobile, Zone 7, addnl reinforcement and reconstruction runways, taxiways, Inv. 01-076-45-319, to Wright Contg. Co., 504 25 Ave., Columbus, Ga. $1,350,000. Bids 5/14.

†**California**—STORAGE AREA—U. S. Eng., 74 New Montgomery St., San Francisco, storage area, Marin Co., Contr. W-04-303-eng-1938, to Piombo Bros. & Co., 1071 Turk St., San Francisco, $51,600.

★†**Calif., San Bruno**—AIRPORT PAVING etc.—U. S. Eng., 74 New Montgomery St., San Francisco, Zone 19, paving and lighting at San Francisco Airport, to Macco Constr. Co., & Morrison-Knudsen Co., Inc., San Bruno, $882,675.

†**Calif., San Bruno**—AIRPORT DRAINAGE WORK—U. S. Eng., 75 New Montgomery St. San Francisco, Zone 19, drainage work, San Francisco Airport, Contr. 04-203-eng-2072 to Macco Constr. Co. & Morrison-Knudsen Co., Inc., San Bruno, $56,690.

†**Fla., Daytona Beach** — AUTOMATIC SPRINKLER SYSTEM — U. S. Eng., Post Office Bldg., Savannah, Ga., automatic sprinkler sys. at Welch Convalescent Hospital, to Moore Pipe & Sprinkler Co., 1320 W. State St, Jacksonville, $64,763.

†**Fla., Morrison Field (br. West Palm Beach)**—APRON, etc.—U. S. Eng., Post Office Bldg., Savannah, Ga., apron, access roads, miscellaneous drives, to H. E. Wolfe Constr. Co., Inc., St. Augustine, $284,299.

†**Idaho and Washington**—SONIC SCORING TARGETS, etc.—U. S. Eng., 623 Pittock Block, SW, 10 Ave. and Washington St. Portland 5, Ore., sonic scoring targets, generator houses, appurtenances at Gowan Field Boise, Mountain Home Field, Idaho, and Walla Walla Field, Wash., to V. Jarl, Gresham, Ore., $54,919. Awarded 5/15.

†**Kansas**—EXCAVATION, etc.—U. S. Eng. 10 E. 17 St., Kansas City 8, Mo., excav., overhaul, installing concrete culvert pipe, railroad track, etc., Sunflower Ordnance Works, Contr. W-23-038-eng-343, Johnson Co., to Wm. A. Smith Constr. Co., Inc. Houston, Tex., $64,460.

†**Kan., Topeka**—SWIMMING POOL, etc.—U. S. Eng., 10 E. 17 St., Kansas City 8, Mo., swimming pool, bath house, incl. filter plant, walk, culvert, etc., Contr. W-23-038-eng-341, Winter General Hospital, to Bennett Constr. Co., 1805 Harrison St., $59,580.

NCLASSIFIED (Contracts Awarded, Cont'd.)

†Kentucky—OUTSIDE STORAGE PADS, ...U. S. Eng., 522 U.S. Post Office & ...thouse Bldg., Cincinnati 1, O., outside ...rage pads, approaches, barricades, etc., ...ne Grass Ordnance Depot, Contr. W-33-...-eng-929, to Codell Constr. Co., Win-...ester, $570,000.

†Ky., Louisville—SWIMMING POOL—U. S. ...g., 613 Federal Bldg., Zone 1, swimming ...ol, Nichols General Hospital, Contr. W-15-...-eng-820, to Elmer A. Wehr, t/a E. A. ...hr Constr. Co., 2215 Walterdale Terrace, ...,169.

†Mich., Sault Ste. Marie—PIER EXTEN-...SION—U. S. Eng., 700 Union Guardian ...dg., Detroit, pier exten. at St. Marys ...ls Canal, to Great Lakes Dredge & Dock ..., 122 S. Michigan Ave., Chicago, Ill., ...0,397. CD 3/21—ENR 3/29.

†Mo., Camp Crowder—SWIMMING POOL ...U. S. Eng., 10 E. 17 St., Kansas City, Mo., ...ncrete training swimming pool, to Dit-...ars-Dickmann Constr. Co., Barnes Bldg., ...skogee, Okla., $84,400.

Montana—POWER LINES—Beartooth ...ectric Cooperative, Red Lodge, $2.77 mi. ...wer lines, Mont. 5018-B1, Carbon, Still-...ter and Sweetgrass Counties, to Bennett ... Lewis, Billings, $77,980. Est. $230,000. ...ds 5/11. CD 4/27—ENR 5/3.

†N. M., Carlsbad—SCORING TARGETS—...S. Eng., Albuquerque, scoring targets, ...my Air Field, Constr. W-29-005-eng-340, ... Gable Electric Service, 6713 Snider Plaza, ...llas, Tex., $58,000.

†N. Y., Mitchel Field (br. Hempstead)—...IRFIELD BLDG.—U. S. Eng., 120 Wall St., ...w York, Zone 5, commissary addn., Contr. ...-10-075-eng-2606, to Roberts Nash Constr. ...rp., 39-15 Main St., Flushing, $32,575.

†N. C., Charlotte—AUTOMATIC SPRINK-...ER SYSTEM—U. S. Eng., Post Office Bldg., ...avannah, Ga., installing automatic sprink-...r sys., to Grinnell Co., Inc., 1431 W. More-...ad St., Charlotte, $105,248.

†N. C., Durham—AUTOMATIC SPRINK-...ER SYSTEM—U. S. Eng., Post Office Bldg., ...avannah, Ga., installing automatic sprink-...r sys. in bldgs., Camp Butner Convalescent ...nter, to Blaw-Knox Constr. Co., Inde-...pendence Bldg., Charlotte, $71,332.

†Md., Edgewood Arsenal—CONCRETE ...PRONS—U. S. Eng., Standard Oil Bldg., ...altimore, Zone 2, enlarging concrete aprons, ...ntr. W-18-020-eng-836, to H. R. Miller ..., Lancaster, Pa., $31,775.

†S. D., Provo—OPEN STORAGE PADS, ...—U. S. Eng., 909 17 St., Denver, Colo., ...en storage pads and barricades at Black ...lls Ordnance Depot, to Northwestern Engi-...ering Co., Box 567, Denver 1, Colo. $219,000.

†Tennessee—OPEN STORAGE PADS—U. S. ...g., Grant St., west of Westwood St., ...obile 1, Ala., ammunition open storage ...ads, Milan Ordnance Depot, Contr. W-01-...-eng-1007, to Oman Constr. Co., Acklen ...ark, Nashville, $268,350.

†Tex., Eagle Mountain Lake—RUNWAY ...AL COATING, etc.—Yards & Docks, Navy ...pt., 18 St. and Constitution Ave. N.W., ...ash. 25, D. C., seal coating and marking ... runways, Marine Corps Air Station, NOY ...1812, to N. B. Hoffman, 408 Mid-Continent ...dgs., Fort Worth, $51,240.

†Tex., Longview—SWIMMING POOL—U. S. ...g., 231 W. Main St., Denison, rein.-con. ...imming pool at Harmon General Hospital, ... Rob. E. McKee, P. O. Box 2848, Dallas, ...pprox. $54,000. Est. $75,000. CD 5/23.

†Tex., McKinney—SWIMMING POOL—...S. Eng., 231 W. Main St., Denison, rein.-...n., outdoor swimming pool, Ashburn Gen-...al Hospital, to Rob. E. McKee, P. O. Box ...48, Dallas, approx. $50,000. Est. $75,000. ...D 5/23.

Utah—PIPELINE—Utah Oil Refining Co., ...ah Oil Bldg., Salt Lake City, 26 mi. 8 in. ... pipeline from Uintah Junction to Salt ...ke City, to Anderson Bros., McBirney ...Mfg., Tulsa, Okla. CD 5/9—ENR 5/24.

†Wash., Seattle—FLIGHT TEST BLDG.—...U. S. Eng., 1400 Textile Tower Bldg., ...eattle, Zone 1, experimental flight test ...dg., Boeing Field, Contr. W-45-108-eng-...18, to John W. Maloney & Assoc., Yakima, ...97,500.

Wash., Spokane—TRACK, etc.—Northern ...acific Ry. Co., B. Blum, ch. engr., 176 ... 5 St., St. Paul, Minn., 16,597 ft. track ...nd 21 turnouts, day labor. $62,480. CD 3/21 ...ENR 3/29.

Ont., Timagami—SHIPYARD BLDGS.—...imagami Navigation, Ltd., North Bay, boat ...ouse, workshop, storehouse, office, etc., to ...ill-Clark-Francis, Ltd., New Liskeard, $49,-...00. CD 4/9—ENR 4/12.

Ont., Welland—RECREATION CENTRE, ...tc.—City, J. D. Watt, clk., recreation centre ...nd ice arena, to W. C. Brennan Contg. Co. ...td., 400 Gage St. N., Hamilton, about ...150,000. W. A. Kearns, 40 E. Main St., ...rcht. CD 7/27—ENR 8/3.

Proposal Advertisements see p. 157 & 176
Postwar Projects see p. 116

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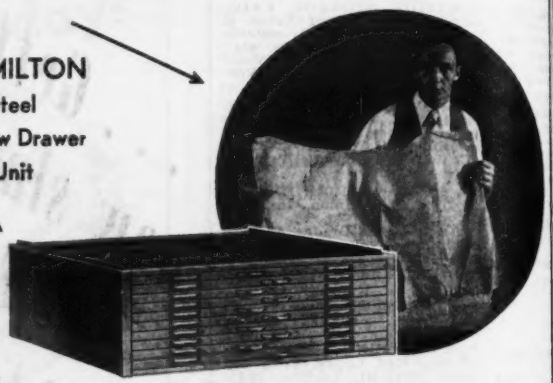

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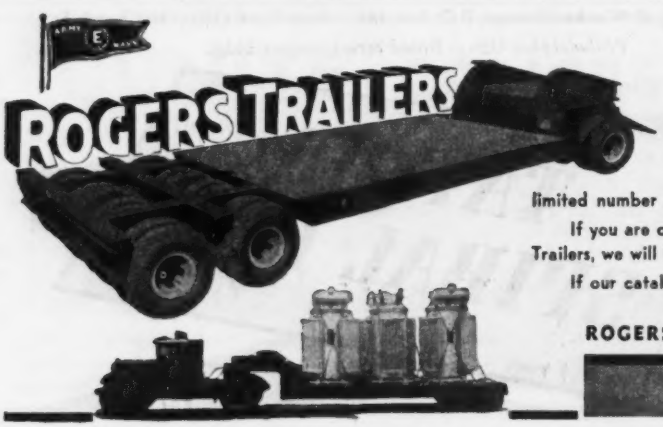

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